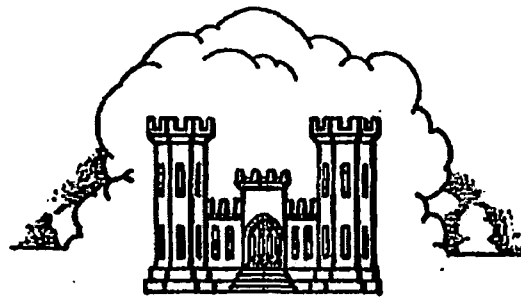

**SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE
MANUAL**

**SACRAMENTO RIVER
FLOOD CONTROL PROJECT**

**UNIT NO. 159
PUMPING PLANTS NO. 1, 2 & 3
SUTTER BYPASS**



**U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA**

CORPS OF ENGINEERS

U. S. ARMY

SUPPLEMENT TO STANDARD

OPERATION AND MAINTENANCE MANUAL

SACRAMENTO RIVER FLOOD CONTROL PROJECT

UNIT NO. 159

PUMPING PLANTS NOS. 1, 2 & 3

SUTTER BYPASS

REFER TO Reclamation
Board Application # 12403
replaces 2 P.P. # 3
MARCH 1978

RB # 13020 REPLACES P.P. # 1
" 13021 " P.P. # 2
AUG 1980

SACRAMENTO DISTRICT
CORPS OF ENGINEERS
U. S. ARMY
December, 1959

**SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
SACRAMENTO RIVER FLOOD CONTROL PROJECT**

UNIT NO. 159

PUMPINT PLANTS NO. 1, 2 &3
SUTTER BYPASS

| LOCATION | ADDITION OR REVISION | DATE |
|-----------------|--|-------------|
| Exhibit F | Add copy of letter of transfer dated 23 Sep 1940 | 28 Dec 2010 |
| Exhibit F | Add copy of letter of transfer dated 29 Dec 1941 | 28 Dec 2010 |
| Exhibit F | Add copy of letter of transfer dated 9 Sep 1944 | 28 Dec 2010 |
| Exhibit F | Add copy of letter of transfer dated 29 Nov 2016 | 29 Dec 2016 |

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SUPPLEMENT TO STANDARD
OPERATION AND MAINTENANCE MANUAL
SACRAMENTO RIVER FLOOD CONTROL PROJECT

UNIT NO. 159
PUMPING PLANTS NO. 1, 2 and 3
SUTTER BYPASS

SECTION I

INTRODUCTION

1-01. Location. The improvement covered by this manual is that part of the Sacramento River Flood Control Project which includes Pumping Plants Number 1, 2 and 3 located along the left bank (easterly side) of the Sutter Bypass in Sutter County, California. These Pumping Plants are located about 10 miles southwesterly from the City of Marysville, California. For location and general type of installation see Exhibits A-1 and A-2 of this manual.

1-02. Protection Provided. Pumping Plants Number 1, 2 and 3 provide direct protection to adjacent agricultural areas in their respective drainage areas. Plant No. 1 has a total capacity of 280 c.f.s. capable of operating against a variable head ranging from 0 to 19 feet through four pumping units. Plant No. 2 has a total capacity of 775 c.f.s. through 5 pumping units capable of operating against a variable head ranging from 0 to 21 feet. Plant No. 3 has a total design capacity of 180 c.f.s. through four vertical-propeller type pumps capable of operating efficiently against total dynamic heads ranging from 0 to 17 feet.

1-03. Project Works. The flood control improvement covered by this manual is part of the Sacramento River Flood Control Project authorized by the Flood Control Act of 1917 as modified by the Acts of 1928, 1937 and 1941, and consists of three drainage pumping plants. In addition to being used for flood control reverse gravity flow through the pumps to the irrigation distribution system may be employed to satisfy local irrigation demands. Also, the pumps are generally used before the normal flood season to drain water from rice fields.

1-04. Construction Data and Contractor. Construction work was accomplished under one lump sum contract. Pertinent data on the contract is as follows:

Construction was accomplished under Contract No. W-1105-eng-1103 by the Frederick W. Snook Company, and completed in August 1936. Contract drawings will be found under File Nos. 50-25-1445-1, 50-25-1446-2, 50-25-1447-1 and 50-25-1473; and Specifications No. is 6757.

1-05. Flood Flows. For purposes of this manual, the term "flood" or "high water" shall refer to water stages at the vicinity of the pump sumps when pumping will be required during the following gage readings:

Pumping Plant No. 1 (Chandler)

Start pumping at a gage reading of 29.0.
Stop pumping at a gage reading of 26.5.
(During the wet season a sump gage reading height of 28.5 will be maintained by continuous pumping.)

Pumping Plant No. 2 (O'Banion)

Start pumping at a gage reading of 30.0
Stop pumping at a gage reading of 27.8
(During the wet season control to 29.5 maximum stage by continuous pumping to maximum extent possible.)

Pumping Plant No. 3 (Wadsworth)

Start pumping at a gage reading of 38.5
Stop pumping at a gage reading of 36.0
(During the wet season a sump gage reading height of 38.0 will be maintained by continuous pumping insofar as is practical.)

1-06. Assurances Provided by Local Interests. Assurance of cooperation by local interests is provided by State legislation, as contained in Chapter 3, Part 2, Division 5 of the State Water Code (see paragraph 2-02a of the Standard Manual).

1-07. Acceptance by the State Reclamation Board. Responsibility for operating and maintaining the completed works was officially accepted by the Reclamation Board of the State of California on 16 October 1940 for Plant No. 1, 4 October 1944 for Plant No. 2 and 6 January 1943 for Plant No. 3, as shown on the attached copies of letters of acceptance, Exhibit F.

1-08. Superintendent. The name and address of the Superintendent appointed by local interests to be responsible for the continuous inspection, operation and maintenance of the project works shall be furnished the District Engineer, and in case of any change of Superintendent, the District Engineer shall be so notified.

SECTION II

FEATURES OF THE PROJECT SUBJECT TO FLOOD CONTROL REGULATIONS

2-01. Levee.

a. Description. The left bank levee of Sutter Bypass is more fully covered in another supplement manual. Only that portion of the levee which adjoins the pumping plants and which directly affects the structures will be considered in this manual. The levee of this unit has been built to adopted grade and section by new construction. For more complete detail in construction of above-mentioned levee, refer to the "As Constructed" drawings of Exhibit B.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

- (1) Maintenance-paragraph 4-02 of the Standard Manual.
- (2) Check Lists-Exhibit E of this Supplement Manual.
- (3) Operation-paragraph 4-04 of the Standard Manual.
- (4) Special Instructions-paragraph 4-05 of the Standard Manual.

2-02. Drainage and Irrigation Structure.

a. Description. For a more complete description of the mechanical and electrical features and the building structures pertaining to the three pumping plants see Section III of this manual.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

- (1) Maintenance-paragraph 5-02 of the Standard Manual.
- (2) Check Lists-Exhibit E of this Supplement Manual.
- (3) Operation-paragraph 5-04 of the Standard Manual.
- (4) Additional Requirements-paragraph 5-05 of the Standard Manual.
- (5) Safety Requirements-paragraph 5-06 of the Standard Manual.

c. Special Operating Procedure and Inspection.

(1) Each year immediately prior to the start of the pumping season a megger test by qualified electrical engineers will be taken on all pump motors and cables at cable potheads at rear of switchboard.

(2) Data on pumping plants and operating procedure follows:

Pumping Plant No. 1 (Chandler) Drainage Area 16,811 Acres

| Unit | H.P. | Discharge Capacity | Active H.P. | Standby H.P. |
|---------|-------|-----------------------|-------------|--------------|
| 1 | 52.6 | 40 c.f.s. | 52.6 | |
| 2 | 76.1 | 50 c.f.s. | 76.1 | |
| 3 | 300.0 | 140 c.f.s. | | 300.0 |
| 4 | 76.1 | 50 c.f.s. | 76.1 | |
| Aux. | 25.0 | | 25.0 | |
| Totals- | 529.8 | 280 c.f.s. | 229.8 | 300.0 |

Under the proposed schedule the above listed units may be used in any combination with the exception of Unit No. 3 which is reserved as a standby. In the event that Unit No. 3 is to be run for purpose of testing, the Colgate Division of the Pacific Gas and Electric Company must be contacted and arrangements made for test. Starting and stopping of pumping at Plant No. 1 will be at a gage reading of 29.0 and 26.5 respectively. During the wet season a sump gage height of 28.5 will be maintained by continuous pumping.

Pumping Plant No. 2 (O'Banion) Drainage Area 51,262 Acres

| Unit | H.P. | Discharge Capacity | Active H.P. | Standby H.P. |
|--------|-------|-----------------------|-------------|--------------|
| 1 | 253 | 175 c.f.s. | | 253 |
| 2 | 253 | 175 c.f.s. | | 253 |
| 3 | 127 | 75 c.f.s. | 127 | |
| 4 | 293 | 175 c.f.s. | 293 | |
| 5 | 293 | 175 c.f.s. | | 293 |
| Aux. | 75 | | 75 | |
| Total- | 1,294 | 775 c.f.s. | 495 | 799 |

Under the proposed schedule the above listed No. 3 is the prime unit; it may be used with any one of the other units or combinations thereof. Under low head conditions Unit No. 1 or 2 should be used with Unit No. 3 for power economy. However, Units No. 4 or 5 should receive sufficient use to keep them conditioned and ready for use when needed. Should the need arise during test runs to exceed the active

495 H.P. for a short time, prior arrangements must be made with the Colgate Division of the Pacific Gas and Electric Company of Marysville. Starting and stopping of pumping at Plant No. 2 will be at a gage reading of 30.0 and 27.8 respectively. During the wet season a sump gage height of 29.5 will be maintained by continuous pumping to the maximum extent possible.

Pumping Plant No. 3 (Wadsworth) Drainage Area 10,439 Acres

| <u>Unit</u> | <u>H.P.</u> | <u>Discharge Capacity</u> | <u>Active H.P.</u> | <u>Standby H.P.</u> |
|-------------|-------------|-------------------------------|--------------------|---------------------|
| 1 | 39.6 | 30 c.f.s. | 39.6 | |
| 2 | 79.2 | 60 c.f.s. | 79.2 | |
| 3 | 79.2 | 60 c.f.s. | | 79.2 |
| 4 | 39.6 | 30 c.f.s. | | 39.6 |
| Aux. | 10.0 | | 10.0 | |
| Total- | 247.6 | 180 c.f.s. | 128.8 | 118.8 |

Under the above listed units, any pump may be operated singly or any two pumps in combination except Units 2 and 3. If testing of the pumps should necessitate exceeding the above active load of 128.8 H.P. during a short period of time, prior arrangement must be made with the Colgate Division Office of the Pacific Gas and Electric Company in Marysville in order not to change the demand charge. Starting and stopping of pumping at Plant No. 3 will be at a gage reading of 38.5 and 36.0 respectively. During the wet season a sump gage height of 38.0 will be maintained to the maximum extent possible.

2-03. Channel.

a. Description. The channel to be considered in this manual is the drainage channel which leads into the pump sumps for each pumping plant. The drainage channel will be more fully described in Section III of this manual.

can't find in Section III

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

- (1) Maintenance-paragraph 6-02 of the Standard Manual.
- (2) Check Lists-Exhibit E of this Supplement Manual.
- (3) Operation-paragraph 6-04 of the Standard Manual.
- (4) Safety Requirements-paragraph 6-05 of the Standard Manual.

As these pumping stations are manually operated, it will be the duty of the Superintendent to maintain operators at each pumping plant during times of excess water in the drainage channels. The frequency of operation will depend on the knowledge of the operator to keep a close check of water levels in the channel. The Superintendent shall cause readings to be taken at each gage at intervals of one to two hours during the period when the water surface is above high water stages as listed in paragraph 1-05 of this manual and record the time of the observations. One copy of the readings shall be forwarded to the District Engineer immediately following high water stages, and a second copy transmitted as an inclosure to the semi-annual report in compliance with paragraph 3-06 of the Standard Manual.

2-04. Miscellaneous Facilities.

a. Description. Miscellaneous structures or facilities which were constructed as a part of, or in conjunction with, the protective works, and which might affect their functioning, include the following:

(1) Utility Relocation. Change of electric service as required for control of each pumping plant.

(2) Hydrographic Facilities. Staff gages as referred to in paragraph 1-05 of this manual. These gages to be maintained by the State.

b. For pertinent Requirements of the Code of Federal Regulations and other requirements see the following:

(1) Maintenance-paragraph 7-02 of the Standard Manual.

(2) Check Lists-paragraph 7-03 of the Standard Manual.

(3) Operation-paragraph 7-04 of the Standard Manual.

SECTION III

DATA ON MECHANICAL AND ELECTRICAL FEATURES

3-01. Mechanical and Electrical Features.

a. Description. Three drainage pumping plants are located along the easterly levee of the Sutter Bypass for the purpose of pumping intercepted drainage into the Bypass Canal. For specific location of the respective Pumping Plants No. 1, 2 and 3 see Exhibit A-1. For pictures showing the general type of installation see Exhibit A-2. Each plant consists essentially of a pumphouse over a series of pumping pits into which the respective pumps extend, pump-motor units, electrical controls, and appurtenances. For type of equipment and installation plan see contract drawings of Exhibit B, shop drawings and other data included herewith. The intercepted drainage is conducted by the drainage system into the pumping pits from whence it is pumped through concrete conduits to the Bypass Canal; the pump discharge connection in each instance being connected to the conduit by a metal pipe or transition. The number of pumps and the combined capacity for each plant is as follows:

| <u>Plant No.</u> | <u>Number of Pumps</u> | <u>Total Pump Capacity CFS</u> | <u>Drainage Area in Acres</u> |
|------------------|------------------------|--------------------------------|-------------------------------|
| 1 | 4 | 280 — | 16,811 |
| 2 | 5 | 775 | 51,262 |
| 3 | 4 | 180 | 10,439 |

The pumps for the above plants were supplied by the Worthington Pump and Machinery Corporation, with the exception of Unit No. 3 in Plant No. 1 which was supplied by the Byron Jackson Pump Company. The electrical equipment was supplied by the General Electric Company. It will be noted, from a study of the plans, that during the irrigation season, with the water surface sufficiently high in the Bypass Canal, the water will flow by gravity through the pumps to the irrigation distribution system, in those instances where check valves are not provided in the pump discharge lines and providing the flapgates on the end of the discharge conduit at the Bypass Canal are being held in an open position. This reverse flow for irrigation may be controlled by manually operated slide type gates installed in the pump discharge lines between the pump and the Bypass Canal. The slide gate hoists are installed on the crest of the Bypass Canal levee. During the normal pumping phase the slide gates are open and the flapgates function to prevent reverse flow through the pump.

b. Main Pump-Motor Units.

(1) Plant No. 1.

(a) Four pumping units are provided having a combined capacity of 280 c.f.s. under a total dynamic head of 13 feet, divided approximately as follows:

| Unit No. | <u>Pump</u> | | <u>Pump Motor</u> | |
|----------|-----------------|-------------------------|-------------------|---------------------|
| | Capacity in CFS | Type | H.P. | Full Load Speed RPM |
| 1 | 36 | Squirrel Cage Induction | 52.6 | 350 |
| 2 | 52 | " | 76.1 | 320 |
| 3 | 140 | " | 300 | 288 |
| 4 | 52 | " | 76.1 | 320 |

The pumps are of the vertical type. Units No. 1, 2 and 4 are propeller mixed-flow and Unit No. 3 is a centrifugal type; each directly connected to an electric motor mounted on the pumphouse operating floor above the pump. The pump is supported by the floor of the pumping compartment located under the operating floor, and the pump discharge in each instance is connected to the concrete conduit by a cast iron flanged transition section. In the case of pump units No. 1 and No. 2, a swing check valve is installed between the pump discharge and the transition section, inasmuch as the discharge from both these pumps are joined into a common conduit, thus permitting the pumps to be operated singly or simultaneously. The remaining pumps each discharge through a single conduit. A manually operated slide gate is provided in the discharge of each of the three conduits which permits closing off the conduits from the Bypass Canal when desired.

(b) The pumps are directly connected to vertical 2,200 volt, 3 phase, 60 cycle squirrel cage induction motors. The motor controls for Units No. 1, 2 and 4 consist of push button operated, across-the-line type of magnetic starters, with hand reset type thermal relay overhead protection. The main contacts of the starter are equipped with arc boxes and arresters. Unit No. 3 is operated by a manual oil insulated compensator starter. Thermal overload relays are provided.

(2) Plant No. 2.

(a) Five pumping units are provided having a combined capacity of 775 c.f.s. under a total dynamic head of 13 feet for pump units No. 1 and 2, and 15 feet for pump units No. 3, 4, and 5. The pumping capacity of the plant is divided approximately as follows:

| Unit No. | <u>Pump</u> | <u>Pump Motor</u> | | |
|----------|-----------------|----------------------|------|---------------------|
| | Capacity in CFS | Type | H.P. | Full Load Speed RPM |
| 1 | 175 | Vertical Synchronous | 253 | 171.3 |
| 2 | 175 | | 253 | 171.3 |
| 3 | 75 | " | 127 | 300.0 |
| 4 | 175 | " | 293 | 180.0 |
| 5 | 175 | " | 293 | 180.0 |

These pumps are the vertical volute mix flow type each directly connected to an electric motor mounted on the pumphouse operating floor above the pump. The pump is supported by the floor of the pumping pit located under the pumphouse operating floor and the discharge, in each instance, is connected to the concrete conduit by a cast iron flanged transition. A manually operated slide gate is provided in the discharge of each of the five conduits which permits closing off the conduits from the Bypass Canal when desired. When the water surface in the canal is above the pump discharge conduit outlets, the flap gates installed at the canal end of the conduits automatically close unless they are manually raised and locked in open position.

(b) The pump motors are the 2,200 volt, 3 phase, 60 cycle vertical synchronous type. Synchronous motor controls are the magnetic full voltage across-the-line type with Korndorffer voltage booster and include the following functional features:

1. Means for applying A.C. power to motor.
2. Overload protection for motor-stator windings and Amortisseur windings.
3. Undervoltage protection.
4. Means for automatically applying field excitation when motor has reached the proper speed.

5. Provision for automatic field excitation removal if motor pulls out of step.

6. Line and field ammeters for guidance in the operation of the motor.

7. Rheostat operating mechanism.

8. Korndorffer voltage booster and appurtenances.

(3) Plant No. 3.

(a) Four pumping units are provided for this plant having a combined capacity of 180 c.f.s., under a total dynamic head of 11 feet. The pumping capacity is divided approximately as follows:

| Unit No. | <u>Pump</u> | Type | <u>Motor</u> | |
|----------|-----------------|----------------------------------|--------------|---------------------|
| | Capacity in CFS | | H.P. | Full Load Speed RPM |
| 1 | 30 | Vertical Squirrel Cage Induction | 39.6 | 500 |
| 2 | 60 | " | 79.2 | 350 |
| 3 | 60 | " | 79.2 | 350 |
| 4 | 30 | " | 39.6 | 500 |

These pumps are of the vertical propeller type each directly connected to vertical electric induction motors mounted on top. The pump-motor assembly is supported by the pumphouse operating floor and the column extends into the pumping pit below. The connection from each pump discharge to the concrete conduit consists of a check valve having multiple swinging flap valves, a flexible coupling and a steel pipe transition, assembled in this order from the pump. The discharge pipes from pumps No. 1 and 2, and from pumps No. 3 and 4 are joined into a common conduit a short distance from the pump discharge. The check valves permit the operation of the pumps singly or simultaneously; also prevent reverse flow through the pump when the pump is not being operated. No screen is provided over the individual suction of each of the pumps. The pumping pit is surrounded by a bar screen or rack to exclude materials which might damage the pump.

(b) The pump motors are of the 440 volt, 3 phase, 60 cycle vertical induction type. The motor controls consist of push button operated, across-the-line type magnetic starters, with hand reset type thermal relay overload protection. Three-wire push buttons are provided to start and stop the motors and to provide no voltage release in case of voltage failure. The main contacts of the starter are equipped with arc chutes and arc arresters.

c. Electrical System.

(1) General. Power to operate the electrical facilities is supplied by the Pacific Gas and Electric Company. For type and location of the principal units of electrical equipment provided as part of the respective pumping plants, refer to pertinent contract and shop drawings and other descriptive data included herewith as well as the technical data supplied by the manufacturers of the equipment installed.

(2) Transformers. Government owned transformer stations are provided to transform the 11,000 volt supply line to 2,200 volts as required for the equipment at each plant and are summarized below:

(a) Plant No. 1.

1. Three transformers, self-cooled oil immersed, weather-proof type, 11,000 - 2,200 volts, 201 KVA, 60 cycle, single phase, arranged for delta-delta connection, together with concrete foundation and outside steel switch and bus structure, including lightning arresters, 11,000 volt fuses, mountings and disconnecting switch. The main secondary service of 2,200 volt is connected to panel No. 1 of the main switch board inside the pumphouse. From panel No. 1 bus, feeders distribute power to the four main pump motor panels. The transformer station is located outside the pump house and is inclosed by an 8 foot high fence having a swing gate for access to the inside of the inclosure.

2. An auxiliary bank of three transformers 2,200 - 220/110 volts, 2 - 7-1/2 KVA and 1 - 10 KVA, 60 cycle, single phase, arranged for delta-delta connection, is included in the transformer station. The main service from these transformers are connected to panel No. 6 of the switchboard to supply the power requirements for 110/220 volt auxiliary power service such as sump and priming pump motors and the lighting system. The transformer primary is protected by fusible cutouts. These transformers are the single phase, self-cooled oil immersed, weather-proof type.

(b) Plant No. 2.

1. Three transformers, self-cooled, oil immersed, single phase, weather-proof type, 11,000 - 2,200 volts, 390 KVA continuous rated, 60 cycle, single phase, arranged for delta-delta connection, with foundation, fencing, outside steel switch and bus structure, including lightning arresters, lighting fixtures, 11,000 volt fuses and mountings and disconnecting switches. This station is located outside the pumphouse and the main secondary service of 2,200 volt is connected by underground cable to panel No. 1 of the main switch board which is located inside the pumphouse. From panel No. 1 bus, feeders distribute the power to the five pump motor panels.

2. The above station also includes three auxiliary transformers, self-cooled, oil immersed, weather-proof type, 2,200 - 220/110 volt, 25 KVA. Continuous rated, 60 cycle, single phase, arranged for delta-delta connection, with service connected to panel No. 7 of the main switch board to supply the power requirements of the two excitation motor generator sets, sump pump motor, compressor, and the lighting system.

(c) Plant No. 3.

1. Three transformers, self-cooled, oil immersed, weather-proof type, single phase, 11,000 to 440 volts, 103 KVA continuous rated, 60 cycle, single phase, arranged for delta-delta connection, together with, outside bus structure, steel transformer supports, lightning arresters, fuses and mountings, and 11,000 volt disconnecting switch and surrounding fence. This station is located along the outside of the pumphouse and the main service is connected to panel No. 1 of the main switch board in the pumphouse. From panel No. 1 bus, feeders distribute this power to the four main pump motor panels.

2. An auxiliary dry type transformer, 2 KVA, 440/110 volt is provided in rear of panel No. 1 of the main switch board to supply power for the lighting system in and around the pumping plant.

(3) Outdoor equipment. In addition to the above transformer banks, the following General Electric Company outdoor equipment is provided at each plant:

Plant No. 1

To Control:

- 1 - Incoming circuit, 3 phase, 11,000 volts
- 1 - Feeder circuit, 3 phase, 2,200 volts

- 1 Horn gap switch, Type TC-1 TPST 15 K. V. 200 Amps.
DL-6052362 G-2 Outline M-6018397 P-3
Assembled with bus terminals as listed below:

| | |
|------------------------|----------------------|
| <u>No. of Switches</u> | <u>Hinge end</u> |
| 1 | P-6029187 G-1 (1/2") |

- 1 Manual Direct Operating Mechanism
DL-6052307 G-1 Outline P-6018918 P-1 for MK#101
- 1 Std. galv. iron oper. pipe 1" x 15 ft. long for MK#103
- 3 Porcelain cutouts 5,000 volt 60 amp. Cat. #6x2433
- 3 Fuse supports, Type EF-1 SPST 15 KV P-2878255 G-9
Outline M-3670974 P-2

| | |
|---------------------------|---------------------------------------|
| <u>No. of Fuse Supts.</u> | 1-1/2" P-6028546 G-1 on contact end & |
| 3 | 1-1/2" P-6028546 G-1 on hinge end |
- 3 Fuses Type EG-1 15 K.V. 50 amps. P-6029160 G-27 for MK#201
- 3 Fuse links for cutouts 10 amps. Cat#9FLA130 For MK#107
- 11 Tee connectors 1/2" main 1/2" branch P-6028554 G-1
 - 3 Tee connectors 1/2" main 4/0 branch P-6029119 G-2
 - 3 Tee connectors 1/2" main 2/0 branch P-6029119 G1
 - 5 Tee connectors 2/0 main 2/0 branch P-6028507 G-2
 - 3 Disconnecting clamps 200 amp. P-6021459 G-1
- 11 Bus support fittings for 1/2" U.H. P-6026206 G-11
 - 2 Bus support fitting for 1/2" U. R. P-6026206 G-3
 - 2 Bus support fittings for 2/0 U.R. P-6026206 G-1
- 11 Insulators 7.5 KV K-6009910 P-1 for MK#217
 - 4 Insulators 15 K.V. K-6009911 P-1 for MK#'s 219 and 301
- 1 Fuse hook 14 ft. long P-6029679 G-14
- 3 Strings of strain insulators 2 unit Locke Cat. #5800
- 3 Strain clamps, Locke Cat. #20087

- 3 Hooks Locke Cat. #9994
- 10 Danger sign nameplates N. P. #28646
- 1 Galvanized steel structure complete with all the necessary galv. bolts and nuts for erection of the structure and for mounting of equipment on structure.
- 3 Pellet Lightning Arrester Cat. #9LA10A6 for use on 11 K.V. circuit.

Plant No. 2

To Control: -

- 1 - Incoming circuit, 3 phase, 11,000 volts
- 1 - Feeder circuit, 3 phase, 2,200 volts
- 1 Horn Gap Switch, Type TC-1 TPST 15 KV 200 Amps.
DL-6052362 G-2 Outline M-6018397 P-3
Assembled with bus terminals as listed below:-

| | |
|------------------------|----------------------|
| <u>No. of Switches</u> | <u>Hinge End</u> |
| 1 | P-6029187 G-1 (1/2") |
- 1 Manual Direct Operating Mechanism
DL-6052307 G-1 Outline P-6018918 P-1 for MK#101
- 1 Std. Galv. Iron Oper. Pipe 1" x 15 ft. long for MK#103
- 3 Porcelain cutouts, 5,000 Volt 60 Amp. CAT #6 x 2433
- 3 Fuse supports, Type EF-1 SPST 15 K.V. P-2878255 G-9
Outline M-3670974 P-2

| | |
|---------------------------|---------------------------------------|
| <u>No. of Fuse Supts.</u> | 1-1/2" P-6028546 G-1 on contact end & |
| 3 | 1-1/2" P-6028546 G-1 on hinge end. |
- 3 Fuses, Type EG-1 15 K.V. 100 Amps. P-6029160 G-30 for MK#201
- 3 Fuse links for cutouts 20 amps, Cat. # 9FLA133 for MK#107
- 11 Tee connectors 1/2 main 1/2 branch P-6028554 G-1
- 3 Tee connectors 1/2 main 4/0 branch P-6028554 G-2
- 3 Tee connectors 1/2 main 2/0 branch P-6029119 G-1
- 5 Tee connectors 2/0 main 2/0 branch P-6028507 G-2

- 3 Disconnecting clamps 200 Amp. P-6021459 G-1
- 11 Bus Support Fittings for 1/2" U.H. P-6026206 G-11
- 2 Bus Support Fittings for 1/2" U.R. P-6026206 G-3
- 2 Bus supports fittings for 2/0 U.R. P-6026206 G-1
- 11 Insulators 7.5 K.V. K-6009910 P-1 for MK#217
- 4 Insulators 15 K.V. K-6009911 P-1 for MK#219 & 301
- 1 Fuse hook 14 ft. long P-6029679 G-14
- 3 Strings of strain insulators 2 unit Locke Cat. #5800
- 3 Strain clamps, Locke Cat. #20087
- 3 Hooks, Locke Cat. #9994
- 10 Danger sign nameplates N.P. #28646
- 1 Galvanized steel structure, complete with all the necessary galv. bolts and nuts for erection of the structure and for mounting of equipment on structure.
- 3 Thyrite station type Lightning Arresters Model 91ALG-19 for use on 11 K.V. circuit.

Plant No. 3

To Control:

- 1 - Incoming Circuit, 3 phase, 11,000 volts
- 1 - Feeder Circuit, 3 phase, 440 volts
- 1 Horn gap switch, Type TC-1, TPST 15 KV 200 Amps
DL-6052362 G-2 Outline M-6018397 P-3
Assembled with bus terminals as listed below:-

| | |
|------------------------|----------------------|
| <u>No. of Switches</u> | <u>Hinge End</u> |
| 1 | (1/2") P-6029187 G-1 |
- 1 Manual Direct Operating Mechanism
DL-6052307 G1 Outline P-6018918 P-1 for MK#101
- 1 Std. Galv. Iron Oper. Pipe 1" in 15 ft. lgths. for MK#103

- 3 Fuse supports, Type EF-1 SPST 15 KV P-2878255 G-9
Outline M-3670974 P-2
Assembled with bus terminals:

| | |
|---------------------------|---------------------------------------|
| <u>No. of Fuse Supts.</u> | 1-1/2" P-6028546 G-1 on contact end & |
| 1 | 1-1/2" P-6028546 G-1 on hinge end. |

- 3 Fuses, Type EG-1 15 KV 25 Amps. P-6029160 G-24
- 3 Tee connectors 1/2" main 1/2" branch P-6028554 G-1
- 6 Tee connectors 4/0 main 2/0 branch P-6028507 G-5
- 3 Tee connectors 4/0 main 4/0 branch P-6028507 G-6
- 3 Disconnecting clamps 200 amp. P-6021459 G-1
- 4 Bus support fittings for 1/2" U.R. P-6026206 G-3
- 4 Insulators 15 K.V. K-6009911 P-1 for MG#213
- 1 Fuse hook 14 ft. long P-6029679 G-14
- 6 3-Bolt clamps GE. Cat. 195441
- 6 Eye Bolts P-3852507 P-8 with one extra nut.
- 3 Strings of strain insulators 2 unit Locke Cat. #5800
- 6 Guy Strain insulators, Locke Cat. #13372
- 6 Connectors, Locke Cat. #27240
- 3 Strain clamps, Locke Cat. #20087
- 3 Hooks, Locke Cat. #9994
5. Danger sign nameplates N.P. #28646
- 1 Galvanized steel structure complete with all the necessary galv. bolts and nuts for erection of the structure and for mounting of equipment on structure.
- 3 Pellet Lightning Arrester Cat. #9LA10A6 for use on 11 K.V. circuit

(4) Main Switch Boards.

(a) General. The main switch boards are group, multipanel type and are located inside the pumphouse. The required electrical meters, relays, rheostats, circuit breakers, disconnect switches, push-button stations for starting and stopping the pump motors, etc., lighting panel board and miscellaneous instruments and controls are mounted on the panel boards, either in front or in the rear of a panel.

(b) Arrangement. The general switchboard arrangement and items of equipment on the respective panels is as follows:

1. Plant No. 1.

Panel No.

Controls

- | | |
|---|---|
| 1 | 2,200 volt, 3 phase, 60 cycle incoming line. |
| 2 | Main pump unit #4-3 phase, 60 cycle, 2,200 volts induction motor |
| 3 | " " " #3- " " " " " " " |
| 4 | " " " #2- " " " " " " " |
| 5 | " " " #1- " " " " " " " |
| 6 | Sump pump motor and sump pump primer motor control, 220 volt 3 phase, 60 cycle induction motors. |
| | Circuit breaker for 220 volt Station Power Circuit Breaker for 110-220 volt single phase, 3 wire lighting system. |

Panel No. 1

- 1-150 volt A.C. Voltmeter 0-3,000 volt scale
- 1-3 phase, voltmeter switch
- 1-Card holer
- 1-400 ampere, 5,000 volt, 3 pole, single throw, automatic trip free, oil circuit breaker with 2 coil inverse time element overload trip.
- 2-current transformers, 400/5 amperes
- 2-Potential transformers, 2,200/110 volt
- 3-400 ampere, 5,000 volt S.P.S.T. rear connected disconnecting switches, complete with safety latches and 90 degree stop mounted above panel
- 1-Set power company's meters and current and potential transformers.

Panel No. 2

- 1-A. C. Ammeter
- 2-Current Transformers
- 1-Start-stop push button station
- 1-Card Holder
- 1-2,200 volt, push button type, oil immersed, 3 phase line starter, with no-voltage release and thermal overload protection.
- 3-200 Ampere, 5,000 volt S.P.S.T. rear connected, disconnecting switches.

Panel No. 3

1-A. C. Ammeter
2-Current Transformers
1-Card Holder
1-2,000 volt starting compensator with overload release
1-Thermal relay
3-5,000 volt S.P.S.T. disconnecting switches

Panels Nos. 4 and 5

Same as Panel No. 2

Panel No. 6

1-Push button station for sump pump motor
1-Push button station for sump pump primer motor
1-220 volt, 3 phase, line starter with thermal overload trip for sump pump motor
1-3 pole, 220 volt circuit breaker for sump pump motor
1-220 volt, 3 phase line starter, with thermal overload trip for sump pump primer motor
1-3 pole, 220 volt circuit breaker for sump pump primer motor.
1-2 pole, 250 volt, 30 ampere, circuit breaker for lighting circuit
1-8 circuit, 3 wire, lighting panel board with circuit breakers

2. Plant No. 2.

Panel No.

Controls

| | |
|---|--|
| X | Five panel Korndorffer Starting Panel board for synchronous motor control |
| 1 | 2,200 volt, 3 phase, 60 cycle, incoming line |
| 2 | Main pump unit #5, 2,200 volt, synchronous motor |
| 3 | " " " #4 " " " " |
| 4 | " " " #3 " " " " |
| 5 | " " " #2 " " " " |
| 6 | " " " #1 " " " " |
| 7 | A. C. side of two exciter motor generator sets and 220/110 single phase lighting circuits, sump pump and priming pump motor controls |
| 8 | D. C. side of 125 volt exciters |

Panel No. X

1-Assembly of five panel sections approximately 15 feet long containing required special starting controls for the synchronous motor. This panel assembly is installed on the right of Panel No. 8.

Panel No. 1

- 1 - Power Factor meter, with current and potential transformers and rotary switch.
- 1 - 150 volt, A. C. voltmeter, 0 - 3,000 volt scale.
- 1 - 3 phase voltmeter transfer switch.
- 1 - 150 volt recording voltmeter with seven day chart and synchronous clock.
- 1 - Card Holder.
- 1 - 600 Ampere, 5,000 volt, 3 pole, single throw, automatic trip free oil circuit breaker with 2-coil inverse time element overload trip.
- 3 - 600 Ampere, 5,000 volt, single pole, single throw, disconnecting switches.
- 2 - Current transformers 600/5 amperes.
- 2 - Potential Transformers 2,200/110 volt, with fuse blocks and fuses.

Panel No. 2

- 1 - A. C. Ammeter.
- 1 - D. C. Field Ammeter.
- 1 - Field Discharge and starting resistors.
- 1 - Two-pole field contractor with auxiliary pole for field discharge resistor.
- 1 - Field removal relay - power factor type.
- 1 - Thermal overload relay, 2 pole, hand reset type.
- 1 - Under voltage relay.
- 1 - Line switch, three pole, oil immersed, magnetically operated.
- 1 - Start-stop push button.
- 1 - Card Holder.
- 3 - 200 Ampere, 5,000 volt, single pole, single throw, disconnecting switches.
- 2 - Current Transformers.

Panels Nos. 3, 4, 5, and 6.
See Panel No. 2.

Panel No. 7

- 1 - 3 pole, 220 volt, circuit breaker, for A.C. side of exciter No. 1.
- 1 - 3 pole, 220 volt, circuit breaker, for A.C. side of exciter No. 2.
- 1 - Start-stop push button for exciter No. 1.
- 1 - " " " " " " No. 2.
- 1 - 2 pole, 220 volt, circuit breaker for lighting circuit.
- 1 - Start-stop push button for sump pump motor.
- 1 - Start-stop push button for sump pump primer motor.
- 1 - Line starter for sump pump motor.
- 1 - Line starter for sump pump primer motor.
- 1 - 8--circuit, 3 wire panel board, with circuit breakers.

Panel No. 7 (cont'd)

- 1 - 3 pole, 220 volt, circuit breaker for sump pump motor.
- 1 - 3 pole, 220 volt, circuit breaker for sump pump primer motor.
- 1 - Start-stop push button for air compressor.
- 1 - Line starter for air compressor.

Panel No. 8

- 2 - D. C. Ammeters for D. C. side of exciters.
- 2 - D. C. voltmeters.
- 2 - 3 pole, air circuit breakers with high overload (short circuit) protection for D. C. side of exciters.
- 2 - Field Rheostats

3. Plant No. 3.

Panel No.

Control

- | | |
|---|---|
| 1 | 480 volt, 3 phase, 60 cycle, incoming line and 480/110 volt, single phase lighting circuit transformer. |
| 2 | Main pump unit No. 4, 440 volt, induction motor. |
| 3 | " " " No. 3, " " " " |
| 4 | " " " No. 2, " " " " |
| 5 | " " " No. 1, " " " " |

Panel No. 1

- 1 - 500 Ampere, 600 volt, 3 pole, air circuit breaker with thermal overload trip, and magnetic short circuit trip.
- 1 - Card Holder.
- 1 - A. C. voltmeter 0 - 500 volt.
- 1 - 3 phase voltmeter transfer switch.
- 2 - 480/120 volt potential transformers with fuse blocks and fuses.
- 1 - 2 pole, air circuit breaker to protect lighting circuit transformers.
- 1 - 2 KVA dry type lighting transformer 480/120 volt.
- 1 - Space for power company's meters.

Panel Nos. 2, 3, 4, and 5.

- 1 - 600 volt, 3 pole, air circuit breaker with thermal and magnetic short circuit trip.
- 1 - Stop-start push button.
- 1 - Card Holder.
- 1 - Push button operated type, linestarter with no voltage release and thermal overload protection.
- 1 - A. C. Ammeter.
- 1 - Current transformer for ammeter.

(5) Motor-Generator Sets. Plant No. 2 is provided with two motor generator sets having required capacity for excitation of the total installed horsepower of the five synchronous motors that operate the main pumping units. The generators are 125 volt D. C. units, 100 amperes, 1755 RPM, 12-1/2 KW continuous rating. Each direct connected to a 220 volt, 3 phase, 60 cycle motor. The exciters are arranged for parallel operation. The above equipment was supplied by the General Electric Company. For further details see the pertinent shop drawings included herewith covering the motor-generator set and control rheostats; also see Exhibit A-2.

(6) Miscellaneous. Other electric equipment and services include electric switching equipment, electric lighting system in and about the plant and operators cottage including flood lights, portable electric heaters, electric water heater in each cottage and electric motor and automatic controls for water pressure system.

d. Cranes. For handling the pumps and other equipment in the pump house, overhead traveling cranes are provided for Plant No. 1 and Plant No. 2, capacity 8 tons and 10 tons respectively. These cranes are the double beam hand operated type with movements of the crane being operated and controlled by pendant hand chain. Hoist trolley travels on a 25 pound rail mounted to the top flanges of the crane bridge beams. The crane runways are 40 pound ASCE rails mounted on 18" I-54.7 girders, one on each side of the pump house. In the instance of plant No. 3 only a hand operated chain block and trolley, 5 ton capacity, is provided, in which case the trolley travels on the lower flange of an I beam suspended from the bottom cord of the roof trusses. The above 8 and 10 ton hand powered cranes were supplied by the Judson-Pacific Company of San Francisco, California.

e. Trash Racks. Plants No. 1, No. 2 and No. 3 inlets to the pumping pits from the drainage system are protected by a steel trash rack structure to prevent the entrance of debris which might clog or otherwise damage the pumps including the sump pumps. These trash racks consists essentially of 3/8" x 3" steel bars on 3" centers with separators. The slope of the racks as installed are 1-3/4" on 1" on Plants No's. 1 and 2. Plant No. 3 racks are vertical.

f. Stop Logs. Stop log guides are provided for Plants No. 1 and No. 2 to permit installation of stop logs to shut-off the flow of drainage into the respective pumping pits to permit dewatering the pits and servicing the pumps when required. Sealing of the stop logs when in place can be improved by installing a canvas frame on the upstream side after they have been assembled in the slots.

g. Sump Pumps and Priming Units.

(1) Sump Pump. Dewatering of the pumping pits, into which the main pumps extend, in case of Plants No. 1 and No. 2 is accomplished in each instance by a vertical centrifugal sump pump. The vertical motor and pump unit is supported by the main floor, the pump extending 6 feet below. A suction manifold is provided from the sumps pump with a branch pipe extending to the bottom of each pumping pit, the lower end of which is equipped with a foot valve. The sump pump piping is 10" standard galvanized steel pipe and flanges, the latter being equipped with rubber gaskets. Selection of the compartment to be dewatered is accomplished by a 10" non-rising stem type gate valve in each branch line, controlled by a 32" manual operated floor stand located on the pump house operating floor. The sump pumps are the vertical centrifugal type, each having a capacity of approximately 1200 gallons per minute under operating conditions, and are directly connected to a 10 H.P. electric motor.

(2) Sump Pump Primer. A priming unit is provided for priming the sump pump when required. See the contract plans for location of the priming units on the pump house operating floor. The priming pump is a Nash Hytor Vacuum type driven by a 2 H.P. Induction Motor.

h. Pressure Water System.

(1) At each of Plants No.'s 1 and 2 an electrically operated pressure water system is provided in connection with the well. The 150 gallon pressure tank is automatically controlled to provide 40 PSI at the outlets in and about the pumping plants and the respective operator's cottage. Each pump has a capacity of around 800 gallons per hour. The pump motors are 110 volt, single phase, repulsion induction electric motors.

(2) Septic Tank. The effluent from the cottage is led by a 6-inch cast iron pipe to a concrete septic tank, etc. The pipe is installed with a fall of around one foot in one-hundred feet.

i. Pump Discharge Gates.

(1) Flap Gates. Swinging flap type gates are provided on the end of the pump discharge conduits. These gates automatically close when the pressure on the Sutter Bypass side exceeds the pressure on the pump pit side. These gates are principally wood reinforced by a steel frame, the frame being hinged at the top in each instance. When it is desired to open one or more of these gates to permit reverse flow for irrigation or servicing the conduit, attach a cable to the bottom of the gate, hoist open, and securely anchor in place. If there is pressure against the flap gate the opening of the flap gate may be facilitated by first closing the conduit slide gates and allowing leakage to equalize the head.

(2) Slide Gates. Slide gates are provided in the pump discharge conduit between the pump and the flap gates. These gates are controlled by a manual operated screw hoists as manufactured by the C. D. Butchart Company, Denver, Colorado. The hoists are located on the crest of the bypass levee. These gates may be employed to close the conduit to facilitate servicing of the flap gates, and dewatering the pumping pits; also to control reverse flow during the irrigation period.

(3) Gate Valve. In the instance of Pumping Plant No. 2 a 36" stub pipe connection is provided from one of the pumping pits to the pump discharge line and is controlled by a 36" gate valve. The manual control stand is located on the operating house floor above and between motors for pumps No's 3 and 4. By opening this valve water can be allowed to flow to or from the canal without going through the pump.

(4) Irrigation Period. During the irrigation season the above gates may be used to control the flow from the canal through the pumps by gravity into the irrigation system. In the case of Plant No. 2, the gates should not be opened for irrigation supply until the pump motor units are properly blocked to prevent rotation.

j. Air Compressor Plant No. 2.

An air compressor is installed in Plant No. 2 and may be employed to facilitate servicing and maintenance of the equipment. The compressor is a Worthington compressor driven by a 10 H.P. induction motor controlled by an automatic pressure switch for a maximum operating pressure of 80 pounds. For a more detailed description see Exhibit A. Do not use the air for cleaning electrical equipment until all moisture has been exhausted from the air supply. Do not use high pressure air for blowing out electrical equipment. 40 pounds should be maximum.

k. Staff Gages.

Wooden staff gages are installed up the bank of the canal levee to gage the water surface in the canal during its various stages. These are principally wood with black indicating numerals which can be viewed from the levee crest.

3-02. Inspection.

Periodic inspections are required to detect incipient faults before serious damage takes place, therefore, the importance of making these inspections cannot be over-emphasized. The frequency and extent of inspection required in a measure will be influenced by the conditions under which the equipment is required to operate including whether or not the particular operation is relatively continuous or periodic for the

period concerned. Once each year the entire mechanical and electrical installation should be given a thorough detailed inspection. The regular more frequent inspections are made shall make certain that all parts of the equipment including controls are in operable condition and properly lubricated; that no parts are missing; that all painted surfaces are covered with adequate coats of protective paints; that there is no evidence of rust; and that the entire plant is in a clean and presentable condition. During inspection the following items, where applicable, should be particularly noted. In order that no items of inspection will be overlooked, an inspection schedule listing all items requiring inspection shall be carried during the inspection as guide, check list and record.

a. Main Pump - Motor Units.

(1) Pumps.

(a) Daily inspections should be made to ascertain that there is sufficient lubricant for the pump bearings and that the pump and motor are operating smoothly, and that there is no abnormal vibration of the assembly. The operator should be instructed to immediately shut off the pump, should an unusual noise or vibration develop, rather than wait to consult with someone else, inasmuch as by prompt action at the instance trouble first develops, serious damage to the pump may be prevented. Noise, vibration, etc., may be due to a worn or damaged bearing, loose anchors, obstruction in pump such as rocks, wood, etc., or other possible causes.

(b) When initially starting the pump, first insure that it is properly lubricated with oil or grease as the case may be, that the lubricant has had time to reach the bearings, also insure that there is ample water in the pumping pit. Where bearings are oil lubricated, insure that the oil reservoir is full and that there are no leaks in the lubrication system. Check the flow inspection indicator where provided to insure that the oil is flowing to the bearings as required. Generally speaking the pump, even though the bearings are grease lubricated, should not be operated without water. In the case of the vertical volute pumps provided for Plants No's 1 and 2, should the wearing rings in the pump be touching while the pump is being run dry they may heat up and lock resulting in serious damage to the pumps. An inadequate supply of water while pumping should also be avoided as the water may be caused to pass through the pump in surges, thus throwing the pump out of balance and causing harmful vibrations to develop, which may cause thrust bearing trouble. Note the presence of any debris which may have accumulated around the suction that would restrict the flow or damage the pump should it be allowed to pass through. Even though trash racks are provided at the inlets to the pumping pit, the possibility that some undesirable objects may have worked through between the trash rack bars, or have been left in compartment by workmen, should not be overlooked.

(c) Check the lubricating pipes provided to carry the lubricant to the pump bearings and note any indication of leakage at any point with particular attention to the connection at the pump housing. Also make note of any unusual noise that might indicate that the lubricant is not reaching the bearings. The grease seal packing rings on the pump drive shaft should be checked occasionally as they may become dry and harden to the extent of scoring the shaft and/or fail to adequately retain the lubricant. For location of the packing rings refer to the applicable shop drawings. Carefully inspect the feed oilers to insure that they are functioning properly, and when set to permit the oil to feed to the bearings it will remain set while the pump is operating. Note any indication that the oiler feed control has become worn, loose, etc., to impair its proper functioning. Check the functioning of the feed oiler control to insure that the control valve is being held open to admit the lubricant when the pump is running.

(d) Inspect the anchors at the pump house operating floor, especially in the case of those pumps in Plant No. 3, whose weight is carried by the floor slab and note any indication of movement of the pump units, and loose bolts.

(e) In the instance of those pumps supported by the floor of the pumping pit under the pump house, as is the case for Plants No.'s 1 and 2, inspect the hold down nuts of the embedded anchorage as well as the cap screws which secure the pump housing to its metal base and note any insufficient tightness or anchorage as well as the cap screws which secure the pump housing to its metal base and note any insufficient tightness or anchorage looseness.

(f) Inspect the discharge connections for signs of leakage at the flanged joints or vibration while the pump is operating.

(g) In the instance of those pumps provided with swing check valves in the discharge lines, note any abnormal noise or sluggishness of movement in opening or closing; with only one of the two pumps feeding the same conduit operating, note any flow back through the stationary pump which would indicate that the check valve is not seating properly. Once each year remove the manhole cover from the top of the checkvalve assembly and inspect the condition of the interior surfaces for cavitation, rust and wear, with special attention to the valve hinge assembly.

(h) Inspect the pump driving shaft and couplings for alignment, and note any tendency for the shaft to vibrate, or any looseness in the couplings and connections. Worn shaft bearings will cause the shaft to vibrate, however, in some instances it may not be easily detected without the use of special instruments.

(i) Carefully inspect all metal work, and note any indications of rust, leakage when pump is operating, abnormal wear or other signs of deterioration.

(j) Insofar as practical occasionally check the ability of the pump to deliver the required capacity and note any indication that the pump is in need of adjustment, suction lines restricted, or debris in the volute.

(2) Motor.

(a) Carefully inspect the motor to insure that it is being properly lubricated. Check especially the oiling system for proper functioning, as well as the supporting brackets and pipe connecting from oiler to the bearing in each instance. Note especially any leakage at the connections, loose bracket or worn parts of the oiler assembly. Feel the bearing housings while the motor is operating and note any indication of abnormal heating at these points. Also note any unusual noise or vibration which would indicate that the bearings require attention and/or the unit is out of balance. Any clicking noise while the motor is running may be due to a cracked ball in the bearings, or some loose part and must be immediately corrected.

(b) Note any oil leaking by the oil seals, or any oil on the outside or inside of the motor housing.

(c) Check the motor for smoothness of operation under full load and note any abnormal noise or vibration of the assembly.

(d) Inspect the electric heaters provided in the motor assembly for proper performance in preventing moisture condensation within the motor.

(e) Inspect the motor for signs of excessive temperature rise due to an apparent overload or other causes. This condition should be reflected in the switchboard ammeter.

(f) Check the functioning of the motor controls especially when starting up under load with particular attention to the synchronous motors in Plant No. 2 which are provided with Korndorffer Starter Controller. Note especially any failure of the motors to "pull-in" throughout the range of loads encountered.

(g) Occasionally inspect the brushes of the synchronous motors and note indications of sparking at the collector rings or wear necessitating replacement adjustment or other maintenance, or tendency of the collector rings to develop flat spots.

(h) Check the motor base anchor bolts to insure tightness also note any indication that the motor base has shifted on its support. The motor assembly must be kept in true alignment with the pump shaft at all times. While checking the motor base also inspect the coupling connection at the juncture of the motor pump drive shaft especially in the instance of those units in Plant No. 2, and note any indication of wear, looseness or start of fracture. Inspect bird screens where provided to insure that they are in place and properly installed.

(i) Check supply of spare parts such as brushes on hand and note need for replenishment of supply.

(j) Carefully inspect all metal work and note rust spots and need for repainting or repair.

(k) Note collections of oil, dust or other material on or around the motor assembly which may constitute a possible fire hazard. In any event it should be removed.

(l) Note any safety hazards including wrenches, etc. left on the operating floor.

(m) Direction of Rotation.

1. When initially starting a motor after it has been previously removed and reinstalled check for correct direction of rotation before applying full load.

2. Irrigation Period. During the irrigation period the water in some instances may be permitted to flow by gravity in the reverse direction through the pump. Note any indication that the pump is being rotated in a reverse direction. In the instance of Plant No. 2, slow rotation may cause wear on the top motor bearing due to possible inadequacy of the bearing lubrication or thrust, since under normal pumping the thrust is upward. Under these conditions the motor should be blocked with timbers or by other approved means in order to prevent rotation of the motor.

b. Electrical System.

(1) Transformers.

(a) The dielectric strength of the transformer oil should be tested at least once every two years by a qualified organization, and the oil filtered if necessary. At least once each year check if there is a need for oil to be filtered. At least once each year check the oil level in the transformers. Inspection of an oil insulated transformer

that is in operation is necessarily confined to observing the oil in the sight glass or indicator; the temperature as indicated by the transformer should be checked each day during the pumping season, noting at the same time both the air or ambient temperature and load condition.

(b) Any debris, including weeds, which have collected on the transformer banks, as well as within or on the fenced inclosure should be removed. Any weeds which have spread through the fence into the inclosure should be removed. The above will insure proper ventilation of the transformers.

(c) Inspect the metal fence and gate and note any maintenance requirements. Check to insure that the gate is properly locked to exclude other than authorized personnel.

(d) Note any indication of an abnormal temperature rise, oil leaks or unusual noise coming from the transformers.

(2) Outside Switching Equipment.

(a) Inspect insulators and switch gear and remove any accumulation of bird nests, kites or other foreign objects.

(b) Check all grounds, ground clamps, etc., to determine whether or not they are sufficiently secure.

(c) Check the supply of spare fuses on hand and note the need for replenishment.

(d) Inspect the insulators for any signs of cracks or other damage. In addition to normal causes, insulators, etc. may become damaged by persons using firearms, throwing rocks, etc.

(e) Make note of any unusual noise which appears to come from the insulation and switch gear.

(f) Occasionally inspect the lightning arresters and grounds-especially after a storm.

(3) Main Switch Boards.

(a) The main switchboard panel boards, switches, instruments, and appurtenances should be kept clean and free from dust. Doors of all cabinets should be kept closed.

(b) Check the switches and controls to insure that they are mechanically and electrically operable. Note especially any indication of sluggish operation.

(c) Note any of the instruments such as meters and recorders which are not registering properly. Check the supply of recording charts on hand and note need for replenishment of the supply.

(d) Note especially any indication of loose connections, insulation deterioration, unusual odors or mechanical failure within or around the switch boards.

(e) Note any failure of the controls on the respective panels to control the operation of the units for which they are intended.

(f) Inspect the enclosure at the rear of the switchboard assembly and note the need for cleaning or other maintenance and insure that the access gate is properly locked at all times except during necessary inspection and maintenance periods.

(g) Circuit Breakers.

1. Oil Type. The main points to be observed in the inspection of an oil circuit breaker are: condition of the oil, condition of contacts, and whether the operating mechanism works freely yet is positive in closing, latching and tripping. The inspector should, while observing their condition, lubricate pins and bushings subject to wear, see that all others are in place, and that all bolts, nuts and set screws having to do with the breaker structure are set tight. Note also any evidence of heating, wipe off all the breaker bushings and check for cracked bushings.

2. Air Type. The same general points should be observed in going over the operating mechanism of an air breaker.

3. Safety. Before approaching a circuit breaker for general inspection, sufficient precautions should be taken to guarantee the safety of the personnel and also prevent damage to the apparatus. The circuit breaker shall be de-energized by opening the breaker and also main disconnecting switch on the switchboard. The control circuit and closing source of power should be cleared to prevent damage or injury from mechanical operation.

(h) Starters.

1. Inspection of the starters should be made at regular intervals for best results—at least once a year and during the period of normal operation. Before removing cover to inspect or adjust the starter make sure that disconnecting switch is open and that the control circuit is de-energized.

2. Check all connections and note any that are not adequately secure.

3. Check to insure that all moving parts work sufficiently free and observe burnings on the contact tips. Also note if there is any indication that not all of the contacts close at the same time.

4. Disconnect the motor starting switch and test the start button, stop button and relays.

5. Make note of any indication of mechanical and/or electrical failure at any point or other points requiring maintenance attention.

6. Note any indication of failure of sequence to close or open properly.

(i) Contactors.

1. Inspect the contactors for proper functioning. Note any indication of excessive heating and check to insure that they have correct travel, correct contact pressure, that the contact surfaces are clean, and that all connections are clean and tight.

2. Check to insure that all moving parts have adequate clearance to move and are not undesirably restricted by mechanical interference or friction.

3. Check the contact gap with the contactor fully open and note any need for adjustment or other attention.

(4) Motor - Generator Sets Plant No. 2.

(a) Check the electrical controls and condition of bearing lubrication before starting unit; also note any indication of bearing heating while unit is operating.

(b) Check the exciter by start and running test. Occasionally check the exciter brushes for wear; also check the exciter commutator for sparking and note whether it is maintaining a clean, smooth surface and that no bluish color or signs of overheating is indicated.

(c) Note any unusual noise while unit is operating.

(d) Inspect the anchor bolts and frame bolts for tightness.

(e) Inspect the metal work and note need for painting or other maintenance.

(f) Rheostat.

Check the functioning of the rheostat including condition of contacts. Note especially any indication of arcing and burning of the contacts. Check operating knob for tightness to shaft.

(5) Miscellaneous.

(a) Check automatic controls for the water pressure system and note any failure to function properly.

(b) Check all electric motors and controls and note need for lubrication or other maintenance.

(c) Note whether all light fixtures and controls are functioning properly and are clean. The flood light fixtures should be clean inside and out. Check the floor lights at night for proper adjustment.

(d) Inspect the circuit breakers and switches and note any indication that maintenance is required. Also check adequacy of the number of spare fuses on hand.

(e) Periodic inspections at least every year should be made of the entire electrical system provided for operation of the main pumping units in the respective Plants.

(f) Reliance for power to operate the electrical facilities is placed on the Pacific Gas and Electric Company. Any conditions noted in the inspection that may effect in any way the reliability of the power supply should be especially noted and brought to the attention of that company in writing or other accepted practice without delay.

c. Cranes.

(1) Check the hoist by operating the manual controls and note any abnormal force required to be applied for the hoisting operation or positioning of the trolley or carriage. While operating the hoist make note of any noise, etc. which would indicate that the hoist is in need of lubrication, or has excessive binding at any point.

(2) Occasionally check the hoisting sheave block hook hoisting rope, bearings and gears for signs of abnormal wear and need for lubrication. It would be well to inspect the hoisting rope

for its full length once each year for signs of rust and points of possible failure under maximum load conditions.

(3) The carriage and trolley rails must be kept securely anchored to their respective supporting beams. Occasionally check the rail anchor bolts and note any that have worked loose.

(4) Inspect the metal work, including chains and cables for rust spots, need for painting or an application of suitable rust preventative or other maintenance.

(5) When inspecting the bearing having removable caps and adjusting shims, note any loose cap bolts or failure of cap to bear on shims; also note any indication of need for additional shims.

d. Trash Racks.

(1) Occasionally check the metal work and note any rust spots, need for painting or other maintenance.

(2) Note the presence of debris including rags, weeds, etc. which may be clogging the openings through the vertical bars. Also note the presence of debris in the collection system, immediately upstream from the trash racks, which can be expected to move against the rack and which should be removed.

e. Stop Logs.

(1) Inspect the stop logs and note whether they are being properly stored and maintained when not in use.

(2) Before lowering the logs into position check the side slots and flow passage, and note any debris which may restrict the lowering of the stop logs and which may prevent adequate sealing off of the water from coming into the pumping compartment. When in place note any indication that logs are not sealing adequately.

(3) When the stop logs are removed inspect to insure that the cover plate for the top of the stop log recess, as well as the screen provided for the inspection opening above is in place and adequately secured to exclude persons and animals from falling into the pumping pits. It is recommended that the gate to the access walkway to stop logs slots and trash racks be kept locked and related fencing be maintained in adequate repair.

f. Sump Pumps and Priming Units.

(1) Sump Pump.

(a) Check the functioning of the gate valve control pedestals and note any abnormal pressure required to be applied to the operating wheel in opening or closing the valves; also note need for lubrication. Where water lubrication or cooling is provided check when unit is operating to insure that it is functioning properly.

(b) When pumps are operating inspect for leaks in the piping at the connections. Inspect the metal surfaces for signs of rust spots.

(c) When practicable inspect the suction and note any rags or other material that may restrict the suction inlet or may cause the foot valve to not seat properly. Before completely dewatering a pumping pit it would be well to inspect the water surface and note any floating debris that should be removed. Any inability of the pump to hold its prime for a reasonable length of time indicating a leak in the suction lines or faulty foot valve should also be noted.

(d) Check the functioning of the pump motor unit as well as the controls and note any points requiring maintenance. Before starting the pump first insure that it is properly lubricated and the control valves in the suction lines are properly set. The sump pump should not be run dry even though the drive shaft bearings are oil and grease lubricated. The pump is provided with wearing rings and should they be rubbing while the pump is running dry they may heat up and lock.

(e) Occasionally inspect the pump anchor bolts to insure that they are sufficiently tight.

(2) Priming Unit.

When operating note any failure of the unit to function as required; also check adequacy of lubrication including water sealing. Inspect the metal surfaces and note need for painting or other maintenance.

g. Pressure Water and Sanitary Systems.

(1) Pressure Water System.

(a) The automatic controls including the electric hot water heater should be checked occasionally to insure that they are functioning properly.

(b) Check the ability of the pump to deliver a relatively uniform flow for its particular design and note any indication that it has insufficient suction pipe or that the foot valve is not seating properly; also note need for lubrication at any point.

(c) The entire water distribution system including faucets should be checked periodically for leaks. Occasionally inspect all exposed metal surfaces for signs of rust spots or other deterioration.

(d) Inspect the water pressure tank including functioning and note any indication of insufficient air at the top of the tank.

(2) Sanitary System.

(a) The operation of the sanitary system is entirely automatic. The septic tank should be inspected every year and sludge removed when it accumulates to one-third the capacity of the tank.

(b) Occasionally check the laundry trays and similar fixtures and note any indication of the drains becoming clogged.

h. Pump Discharge Gates and Hoists.

(1) Slide Gates.

(a) Gates.

1. When accessible the gates should be carefully inspected to insure that all frame and guide anchorages are sufficiently tight, that the gate leaf has freedom of movement, and that the timber portion of the gate is not rotted or the bolts, etc. are free from rust, or that gate opening and guides are not clogged with debris to limit or restrict the gate.

2. Inspect the condition of all metal work and other materials making up the assembly and note need for repair or replacement. Also inspect the gate seal bearing surfaces and note need for maintenance.

(b) Hoist.

1. Check the hoist and note any indication of binding, abnormally excessive hand force required to operate the hoist, and need for lubrication.

2. Check condition of the hoist stem assembly including the guides and anchorage. Give particular attention to stem guide anchors and appurtenances.

3. Inspect all metal work including the hoist assembly, supporting structure, and associated appurtenances and note any need for maintenance.

4. Check condition of the gate well access cover and note any indication of deterioration or hazard. It is good practice to provide suitable means for locking the covers in place and having key retained by plant operator or other authorized personnel in order to prevent ready removal by other than authorized personnel.

(2) Flap Gates.

(a) Inspect the metal and woodwork making up the gate assembly and note need for maintenance.

(b) Note any improper functionings of the gate, including any indication of leakage when closed, limited or sluggish travel when operating as well as any debris which may be present to foul the movement of the flap in opening or closing. Check looseness of hinge anchor bolts and hinge pin wear.

i. Air Compressor Plant No. 2.

(1) Check the air connections for leaks and note pressure being maintained.

(2) Check operation of the controls by bleeding off the air pressure until the compressor starts, and note the pressure build-up at the shut-off point and time for the build-up; also check the functioning of the pressure relief valves.

(3) Note need for lubrication of the compressor and driving motor.

(4) Inspect equipment making up the assembly and note need for repainting, replacement or repair.

j. Fire Protection Equipment.

(1) Regularly inspect all available fire protection equipment for charge, condition and availability for immediate use; also insure that the proper type of units are provided, all in accordance with "Recommended Good Practice of the National Board of Fire Underwriters."

(2) While inspecting the fire protection equipment also note the presence of any fire hazards or related conditions that should be investigated. Note any accumulation of paper, rags, etc. containing paint, grease, cleaning solvent or other combustible materials that constitute a fire hazard. Containers for grease and oil should be stored in a clean and orderly fashion, properly covered, and any surplus grease or oil on outside should be wiped clean. Note whether or not storage room is adequately vented.

(3) Inspect the pumphouse door locks and note any improper functioning or apparent negligence on the part of the plant operators in keeping doors locked when building is not occupied or guarded.

k. Staff Gages.

(1) Inspect the gages to insure that all are in place and in a good state of repair.

(2) Note need for painting or other maintenance.

l. Pumping Plant Structure.

At least once each year thoroughly inspect the entire structure and note need for painting or other maintenance required to restore to its original condition.

m. Hazards.

(1) Check to insure that the proper warning notices are legible and properly posted.

(2) Note presence of any tools or other materials on the floor of the plant operating room which may constitute a hazard. Also insure that no wrenches, bolts or other loose material has been left on the crane or at other overhead points which may possible fall on the floor or on the equipment.

(3) Check all access manholes and note any covers not in place or in need of maintenance.

(4) Insure that the access gate to rear of the main switchboard is kept locked to exclude unauthorized persons.

(5) Note presence of any grease or oil accumulations on floor which may contribute to a fire or slipping hazard.

(6) Note any indication of water leakage through roof, windows, doors or walls.

(7) Inspect ladders and tools or other equipment used for operation and maintenance of the plant and note need for maintenance or replacement.

(8) Be certain no tools, rags, etc., are left on oil switches, circuit breakers, motors or any normally electrical charged portion before applying power.

n. Painting.

At least once each year carefully inspect all painted surfaces and note need for repainting or other maintenance.

3-03. Maintenance. Since proper functioning of the pumping plants are vital to an adequate operation of the drainage system, it is essential that all equipment, controls and appurtenances be continuously maintained in good operating condition. The subjects of maintenance and procedures can be only briefly touched upon herein and should be expanded and improved upon as continued experience is gained in operation of the equipment, and as new improved procedures are developed to expeditiously and efficiently handle the special problem which may arise. All damaged or unserviceable parts shall be repaired or replaced without delay. Before attempting major repair, the applicable contract plans, shop drawings, specifications, as well as catalogs, descriptive data and operating procedures supplied by the manufacturers of the equipment installed should be carefully reviewed. Certain specific points as pertains to the principal units are discussed below; however, full use shall be made of all pertinent technical data furnished with the respective units especially as pertains to repairing and adjusting the main pumping units. For special points requiring maintenance, refer to the periodic inspection reports. Use high grade lubricants which are suitable for the service and in all instances, in accordance with the equipment manufacturers recommendations, or in the absence of which, refer to Exhibit C - Lubrication Schedule, as a general guide. Painting required should be performed in accordance with the original contract specifications. All necessary maintenance work shall be performed by skilled mechanics and electricians; where replacements are made the replacement parts shall be equal in quality to those originally installed or of suitable later improved design.

a. Main Pump - Motor Units.

(1) Pumps.

(a) If excessive vibration or noise occurs when the pump is operating the cause for which is not readily apparent, consult with an authorized representative of the pump manufacturer. It is

absolutely necessary to determine whether mechanical or hydraulic conditions are causing the trouble in order to find a remedy for it. Persons untrained in pump engineering and operation should not be engaged to "trouble shoot" insofar as concerns major problems relating to the pump unit itself. The plant operator should be instructed to immediately stop the pump the instance an unusual noise is discovered, rather than wait to consult with someone else; inasmuch as prompt action may avoid serious damage to the pump. A relative sudden development of abnormal noise or vibration may be due to numerous causes such as bearing failure, loose anchors, or debris sucked into the pump.

(b) When installing, adjusting and performing general maintenance make full use of the "Installation and Operating Instructions" prepared by the pump manufacturer for the pumps installed. The pumps supplied for Plants No.'s 1 and 2 are the vertical volute type whereas those supplied for Plant No. 3 are the propeller type. The propeller pumps are supported at the operating floor of the pump house whereas the vertical volute pumps are supported on the floor of the pumping pit with the driving motor supported by the operating floor above.

(c) In general the pumps are of relative simple, rugged design and normally will require very little maintenance except for keeping the machinery clean and properly lubricated. High grade lubricants shall be used in each instance; however, it is undesirable to use more oil than the instructions call for. Careful and frequent inspections will in most instances reveal sources of possible trouble before they have had a chance to require a major repair operation to be performed.

(d) When it becomes necessary to pull or disassemble the pump unit to inspect, adjust and repair, all parts put back shall be thoroughly cleaned. At this time the bearings should also be carefully cleaned including removal of the old lubricant. The points required to be lubricated and methods provided are indicated on the approved shop drawings included herewith. The vertical volute pump in Plant No.'s 1 and 2 are lubricated by pressure grease forced to the pump suction head bushing. The propeller pumps are lubricated by a sight feed oiler, one quart capacity to lubricate the lower, intermediate and upper bearing bushings. The upper bushing assembly is also provided with a pressure grease fitting. The points provided for applying the lubricant in all instances are accessible from above the pump house operating floor. The feed oiler provided for the propeller type pumps in Plant No. 3 should be set to deliver approximately double the normal requirements for the first five hours of an initial operation; also apply a generous application of grease at the pressure fitting. Delay initial starting of the pump sufficiently to allow time for the lubricant to reach the bearings in each instance. After the initial lubrication repeat the lubrication by means of the

pressure gun about every 4 hours during operation and keep the feed oiler full using the grade of lubricant recommended by the pump manufacturer. Lubrication is the most important phase of pump maintenance and should be checked daily but the lubricant should only be added as required as excessive lubrication is wasteful. It is not enough merely to apply the lubricant at the points provided as it must also be assured that the lubricant is reaching the bearings in each instance. In the case of the feed oiler it should be carefully checked to insure that it is adjusted and functioning properly to feed the lubricant to the bearings in the required amount when the pump is running and that it is not loose or worn to a point where it will be jarred out of adjustment by the normal vibration of the assembly. If any problems develop with the feed oiler which cannot be readily corrected, replace with a new oiler assembly.

(e) In the case of the vertical volute pumps in Plants No.'s 1 and 2, the suction head bearing is supported by cross baffles and alignment of the bearing is maintained by rabbet fits. Pressure lubrication is provided to the bearing from the floor flange. While servicing the pump see that clearances between sleeve and bearing bushings and also between wearing rings are not excessive. If these clearances are excessive the worn parts should be replaced. The bearing grease must be water-resistant, non-fibrous and of medium viscosity at the water temperature.

(f) Packing rings are provided for the pump bearings to prevent leakage of lubricant from the bearings and also to prevent foreign matter from entering the bearings. Extreme lubricant consumption requires replacement of packing. Replace the packing with new packing when the pump is disassembled for servicing or more frequent if required.

(g) In tightening bolted connections use suitable size and proper type of wrench to avoid possible undesired overstressing of the threads and or marring the heads of the bolts and nuts. When assembling the discharge line to the pump discharge flange tighten the bolts, each a little at a time to pull the flanges together evenly and exercise care to insure against the possibility of pulling the pump out of line or throwing an undesired strain on the pump unit. After completing the assembly of the pump to the discharge line carefully recheck the alignment of the pumping unit. Where the weight of the pump is supported from the operating floor slab of the pump house, as in the case of the propeller pumps for Plant No. 3, similar precautions shall also be exercised relative to anchorage at that point as it is important to obtain uniform support for the base plate and to avoid deflection of the column. The foundation for the propeller pumps shall support the weight of the pump evenly on all sides of the baseplate to allow the unit to hang perpendicularly through the opening provided in the pump house operating floor.

(h) It will be noted that those pumps which discharge into a common conduit are provided with a check valve installed in their respective discharge line to prevent feed back from one pump to the other. These check valves must be in proper operating condition at all times and any failure of this valve to operate properly shall be carefully investigated and the necessary maintenance performed without delay. Inspect those points noted on the inspection report and perform such maintenance as required. Give particular attention to the check valve hinge bearing and support assembly, and where the steel portions have become deteriorated by corrosion requiring replacement. It is recommended that when replacing, that stainless steel suitable for the service be substituted to whatever extent practical to minimize maintenance problems. Access to the inside of the check valve is via a manhole on top of the check valve assembly. When inspection and servicing work has been completed, insure that the manhole cover is installed and secured in place properly.

(i) The pumping pit is protected by a trash rack on the supply entrance from the drainage system; however, it is possible that rags, etc. may work through which could wrap around and restrict the pump suction, or in a similar manner wrap around the check valve disk to foul its movement or prevent an adequate closure when the pump is stopped. Any debris noted on the inspection report which might clog or damage the pump should it be allowed to pass through the pump should be removed from the pumping compartment.

(j) Any rust spots noted during the inspection shall be carefully cleaned with a wire brush or other suitable means and repainted in accordance with the original specifications. Unpainted surfaces such as exposed shafting, etc. which have corroded shall be carefully cleaned and coated with water proof grease or suitable rust preventative. This and similar maintenance not classed as an emergency should be performed once a year and during the non-operating period when most practical.

(2) Main Pump Motors.

(a) Carefully investigate all items noted on the inspection report and perform such maintenance as found to be required. Read "Manufacturers Instructions" carefully before installing or operating. Refer to "Motor Name Plate" for proper instruction identification. Assure that the motor bearings are being adequately but not excessively lubricated at the points provided in each instance and that the lubricant is reaching the bearings all in accordance with the manufacturers recommendations. Refer to the data provided on the name-plate of the motor in each instance as well as the applicable Manufacturers Instruction sheet.

Lubrication pipes to the bearings must be kept tight. Supporting brackets provided for the lubrication pipes, sight indicators and appurtenances must be adequately secured to eliminate undesired vibration and noise. Constant vibration of the pipes and appurtenances may result in broken or loosened pipe connections or cause the automatic oiler to be thrown out of proper adjustment. Very little oil should ever be required to be added and where an abnormal drop in the oil level is noted at the inspection point, or other indications of excessive use of oil, the cause must be immediately investigated and corrected. Note for signs of any oil leakage around the oil reservoir or oil piping and feel the bearings to determine whether or not there is any indication of the bearing becoming overheated and if so, shut down the unit.

(b) With reference to the synchronous motors provided in Plant No. 2 the brushes should be frequently checked to make sure that they are not unduly worn down. Keep an extra set of brushes available at the plant and make replacement well before the critical degree of brush wear has been affected. Fit and adjust the brushes to the correct slip ring angle, using fine sandpaper. Care should be taken to see that dirt or particles broken from the edges of the brushes have not lodged between the brush and the surface of the collector rings. The brushes should move freely in the brush holders but should not be so loose that "Cramping" will occur when the machine is operating. Check the spring tension. The collector rings should be smooth and true. There should be no objectionable vibration. In general the temperature should be low and sparking or flashing should not occur.

(c) When installing the pump motors especially those in Plants No.'s 1 and 2, insure that the base when installed is level and that the motor shaft is in true alignment with the pump shaft and that the connecting coupling is tightly bolted with even pressure on all bolts. When tightening the anchor bolts, tighten down the nuts gradually and uniform all around using a wrench of suitable size to permit adequate but not excessive tightening. Before installing shaft coupling, start motor and check to insure that the rotation is in the proper direction, as the pump unit must not be allowed to operate in reverse rotation.

(d) The motor should be kept clean and dry inside and out and any accumulations of oil or moisture present shall be removed. Insure that the motor heaters are functioning and energized to the extent required to keep the motor adequately dry. Should the heaters fail to be energized when the control switch is set to "ON" position, check especially the controlling circuits for loose connections, also check for broken circuits and shorts. Use reasonable precaution to insure that no water, oil or grease is allowed to drip on the motors from overhead such as from the overhead crane.

(e) Should the motor pump unit be allowed to remain idle for any length of time occasionally make a start and short running test to determine whether the unit including the starter and controls are in proper operating condition. Any major repairs or adjustments must be performed only by skilled mechanics and or electricians thoroughly experienced with the type of equipment involved.

(f) Irrigation Period. During the irrigation period the water in some instances is permitted to flow in a reversed direction by gravity through the pump which may cause the pump to rotate slowly. In the instance of those pump motors in Plant No. 2 the top bearing of the motor may not receive adequate lubrication during the period of relative slow rotation thus necessitating preventing rotation by blocking the motor rotor with timbers or by other suitable means. If this is done, a sign should be hung on the motor starting panel reading "Danger, Motor blocked."

b. Electrical System.

(1) General. Give particular attention to the items listed on the inspection report and perform such maintenance required in accordance with the best standard practice for the service with due consideration of all safety precautions. Only qualified mechanics and electricians experienced in the type of equipment involved shall be allowed to perform such maintenance. Maintenance of the power line is the responsibility of the Pacific Gas and Electric Company. A large percentage of electrical failures are due to mechanical failures. An unusual noise in electrical apparatus may be caused by vibration due to an unbalanced or bent shaft, obstruction of the ventilating system, loose parts, faulty alignment, system disturbance or many other abnormal conditions. Generally, no simple device is available for locating the source of or analyzing the noise with the consequence that the action taken must depend primarily upon the judgment and experience of the maintenance personnel. When cleaning any part of electrical equipment use ample precautions to prevent explosions, fires or toxic conditions. Use only approved cleaners with relative low flash points and if toxic, provide sufficient ventilation.

(2) Transformers.

(a) Check transformer oil level by observing the height of oil in the sight glass located at the top of the transformer case. The dielectric condition of the transformer oil should be tested in accordance with A.I.E.E. standards and if found defective, the oil should be circulated through a portable filter press. It is suggested that the oil testing and filtering be done by the serving utility company. In replenishing the transformer oil use No.10 Transil Oil or as specifically recommended by the manufacturer of the units installed.

(b) Any debris which has been blown or thrown within the transformer station inclosure should be removed promptly, especially as pertains to any material such as wire or other metallic objects. Also keep fence inclosure clear of weeds and vines in order not to obstruct transformer ventilation. The fence around the inclosure, including the gate, shall be maintained in good repair at all times; also keep the gate adequately locked to exclude unauthorized personnel. The area around the transformer installation and the pump house should be kept clear and free of rubbish to present an orderly and neat appearance.

(c) Give particular attention to those items listed on the inspection report as requiring maintenance. Any symptoms such as unusual noise should be investigated at once. Any abnormal increase in operating temperature at normal load should be investigated and if the cause cannot be determined, the transformer should be taken out of service and given a thorough inspection.

(3) Outside Switching Equipment.

The switching equipment should be kept clean and in good operating condition at all times. Broken or cracked insulators should be replaced without delay. Permanent grounds must be carefully inspected, and maintained in good repair. Any unusual noise noted as coming from any of the electrical equipment shall be carefully inspected and necessary repairs and/or replacements performed.

(4) Main Switch Boards.

(a) Main switch boards, panel boards, switches, controllers, and appurtenances shall be kept clean and free from dust preferably by blowing with dry compressed air. Care should be taken to insure that the air does not contain moisture. Air should not be used for cleaning instruments. Air in excess of 30 lbs. should not be used on insulation or coils such as motors or solenoids. Doors of all cabinets shall be kept closed to exclude dust. Switches shall be kept mechanically and electrically operable at all times.

(b) Circuit Breakers. Periodically inspect, test, adjust and overhaul, if required, circuit breakers about once each year. Before attempting these or similar maintenance operations first insure that power is disconnected from the board; also consult the applicable catalogs and technical bulletins supplied by the manufacture of the equipment for a detailed description of the unit and recommended procedures for operation and maintenance.

(c) Starters.

1. Carefully investigate all points noted on the inspection report as requiring attention. Before removing cover to inspect or to adjust, make sure that disconnecting switch is open and control circuit is de-energized.

2. Insure that all parts are clean and move freely.

3. Any excess deposits should be removed from the inside surfaces of the arc boxes adjacent to the contacts, and any broken arc boxes should be replaced.

(d) Electrical Contacts.

1. Copper Contacts. If excessive heating is noticed during the inspection period, the most likely point of high resistance (and resultant heating) is where the movable tips make contacts with the stationary tips. If this condition is noticed, dress the contacts with a few strokes of a file. Since copper oxide has a very high resistance and forms on copper contacts rapidly at higher temperature, a few strokes with a file will remove the oxide and reduce the resistance to a low value again. It should be pointed out, however, that contact tips which have been roughened by ordinary service do not have to be kept smoothed so that they will carry the load. A roughened tip will carry current just as well as a smooth tip; however, if large projections should appear on a tip because of unusual arcing, they should be removed. Contacts plated with a small layer of silver should be cleaned with a clean cloth or brush dipped in cleaning fluid. After being cleaned polish the contacts with a clean, dry cloth. The brown discoloration that is found on silver and silver-plated contacts is silver oxide which is a good conductor. It should be left alone unless the contacts must be cleaned for some other reason. When corroded, contacts should be cleaned with No. 0000 sandpaper. This must be done very carefully so as not to remove too much of the silver plating. After the corrosion has been removed polish the contacts with a clean, dry cloth making certain that all abrasive particles are removed and that the shape of the contact has not been changed. Silver-plated contacts that are badly burned or pitted should be replaced. In the event no replacement is on hand at the site, the contacts may be dressed with sandpaper until the burned or pitted spots are removed. If the burns or pits can not be removed by using sandpaper, then use a burnishing tool very carefully. In only extreme emergencies will the use of a file or silver-plated contacts be permitted. In no instance shall highly abrasive materials, such as emery cloth, heavy sandpaper or carborundum paper be used for surfacing relay contacts. In adjusting the contact pressure refer to the manufacturers recommendations and check by the spring balance or other approved methods. In case the contact pressure is below the minimum value required, adjust or install a new spring. Low pressure should be avoided to minimize possibility of excessive heating of the contacts. On multiple pole devices, the spring tension on all poles should be approximately the same and if one is considerably lower than the others, the spring should be replaced.

2. Avoid the use of lubricant on the contacts or bearings of a contactor as oil quickly collects dust and unless parts are frequently cleaned, will interfere with the operation of the contactor.

3. Maintain the contact gap in accordance with the manufacturers instructions.

4. Failure to close may be due to one of the following:

a. Operating coil may be open-circuited.
b. Lead wires to operating coil may be loose or disconnected.

c. Excessive mechanical friction.
d. Power off or voltage below normal.

5. Failure to open may be due to one of the following:

a. Mechanical interference or friction.
b. Welded contacts.
c. Broken contact spring.

(e) All wiring connections in the rear of the switch boards shall be inspected yearly before the pumping season in order to insure that there are no loose contacts and that proper clearances are maintained. All parts of the panel board should be kept clean. Branch circuit breakers which are not normally required to be closed shall be kept in the "OFF" position. The bus voltage should be checked for a phase balance daily and especially after utility service has been restored following an outage.

(5) Motor-Generator Sets - Plant No. 2.

(a) Bearing Lubrication. The motor and the generator shall be kept adequately but sparingly lubricated.

(b) Exciter Brushes. Brushes should be frequently checked to make sure that they are not wearing down until the metal is touching the commutator. It is false economy to use brushes down to the absolute minimum length before replacement. Keep an extra set of brushes available at the installation so that replacement can be made

when needed. Sand in new brushes until they hit the contour of the commutator, and blow out all carbon dust. Use fine sand paper between the brush and the commutator. NEVER USE EMERY CLOTH. When replacing a brush, be sure to put it in the same brush holder and in its original position. Check the springs that hold the brushes against the commutator, because too heavy spring pressure may lead to commutator wear and excessive heating.

(c) Exciter Commutator. The commutator should be clean, smooth, and have a polished chocolate-brown color where the brushes ride. A blue color indicates overheating. Roughness should be removed by sanding. NEVER USE EMERY IN ANY FORM. For this operation remove the brushes from the holders and support them in a manner to prevent falling on or touching the commutator, and run the exciter. Use fine sandpaper and press it against the commutator with moderate pressure, and move it back and forth across the commutator surface. If the commutator is very rough, the armature should be taken out and the commutator turned down in a lathe and the mica undercut. After the armature has been replaced the brushes should be sanded in; this is not necessary after light sand-papering. Whenever the commutator is found to be dirty, it should be wiped clean with a cloth that is free from lint.

(d) Rheostat. Check the control rheostat for proper functioning and perform any maintenance required to be performed.

(e) Installation. The base for the motor-generator set is not designed to be self-supporting and a suitable foundation must be provided so as to prevent deflection, which is shown by tight bearings or excessive, uneven air gaps. Use shims under base as required to correct alignment. Tighten anchors gradually and evenly and when tight, recheck alignment of the motor-generator assembly.

(6) Miscellaneous.

(a) Lighting. The lighting circuits shall be maintained in operable condition at all times. Any outside flood light which has burned out shall be replaced without delay. The lighting fixture shall be cleaned at least once a year, removing all dust and insects. Keep an adequate supply of fuses and light bulbs on hand at all times.

(b) Maintain all other electrical equipment clean, adequately lubricated and in proper operating condition at all times in accordance with best practice for the service, with particular attention to those items noted on the inspection report.

(7) Cleaning Electrical Equipment.

(a) General. Operating instructions provided by the manufacturers emphasize the importance of keeping electrical apparatus clean and dry. Favorable locations, suitable enclosures and adequate ventilation, drip-proof covers, splash-proof protection and heaters to prevent condensation when apparatus is out of service, all reduce interruption and lower maintenance costs.

(b) Cleaning Methods.

1. General. The methods of cleaning insulation include wiping off the dirt with a clean dry cloth, blowing it out with air pressure, drawing it off with such apparatus, and removing dirt with an approved solvent. The method employed depends on the type of equipment and conditions involved.

2. Wiping with a cloth. When the equipment or part to be cleaned is small and only dirt has collected on exposed parts, cleaning with a dry cloth may prove satisfactory, however, waste or cloth material containing lint shall not be used.

3. Compressed Air. When dirt has collected in places which cannot be reached with a cloth, it usually can be blown out with air pressure. The air pressure should not be over 30 pounds and shall not be directed at electrical apparatus until the air stream has had time to clean itself of moisture. When using compressed air for cleaning it is advisable to cover adjacent units to prevent the transfer of the dirt from one piece of apparatus to another. Also clean the floor area and equipment after the cleaning operation is completed to prevent the dirt being drawn back into the unit.

4. Vacuum. This method of cleaning is especially applicable in removing copper dust and other waste materials.

5. Solvent. If dry cloth or compressed air is not sufficient to remove gummed dirt or grease from electrical apparatus, use carbon tetrachloride as a solvent for cleaning. Moisten the cloth sparingly with carbon tetrachloride and wipe off the dirt from the parts to be cleaned. Be sure to have adequate ventilation and avoid inhaling the fumes. Never use gasoline, benzene or benzol for cleaning as these solvents are highly inflammable; their vapors are explosive, and may be corrosive or will dissolve certain types of insulation.

c. Cranes.

(1) The cranes should require very little maintenance except to keep them well lubricated, painted and free from rust. Lubricate the crane assembly in accordance with the manufacturers recommendations, or in accordance with best commercial practice where the type of lubricant is not specifically designated. Care must be exercised, however, to avoid excessive lubrication and leaks so as to eliminate any possibility of oil or grease dropping on the electrical equipment--especially the electric motors. When not in use the crane should, insofar as practical, be moved to a position where the trolley will not be over the major units of electrical equipment.

(2) The hoist rope shall be suitably maintained and any damaged section shall be replaced before a further service. If rust develops in the hoist rope, clean and apply a light coat of rust preventative, such as Dearborn Chemical Company NO-OX-ID, Type E or equivalent.

(3) Clean and refill gear boxes and grease cups every two years. Occasionally swab a light film of lubricant on the exposed gears. Before starting to operate the crane after it has been inoperative for a relatively long period of time, it would be well to give each grease cup one turn to force grease into the bearing.

(4) Keep the metal work well painted in accordance with the original specifications, exercising care that the paint does not reach points where when it hardens it will interfere with the operation of the hoist. For exposed unpainted metal surfaces subject to rusting it may be advisable to apply a film of rust preventative.

(5) Any loose rail anchor bolts noted during the inspection shall be tightened without delay.

(6) Insure that shaft bearings are properly adjusted and that the bearing caps are tight against the adjusting shims.

d. Trash Racks.

(1) The trash racks are provided to prevent debris from entering the pumping compartment that might otherwise tend to clog or damage the pumps. These racks should be kept free from debris.

(2) Any signs of rusting of the metal work shall be thoroughly cleaned and painted.

e. Stop Logs.

(1) The stop logs shall be properly stored and maintained so as to be in serviceable condition when required. Before lowering the stop logs into the recesses provided, first insure that the recesses and the bottom of the concrete culver are clear of any obstructions which might prevent an adequate sealing off of the inlet to the pumping pit.

(2) After lowering the stop logs in place, the sealing off of the flow can be improved upon by lowering a frame covered with canvas over the upstream side. Before entering the pumping pit first insure that the main pumps are not running and will not be accidentally started during any servicing or inspection operation. When stop logs have been removed insure that the cover plate and the screen above is in place and securely anchored. Every caution must be exercised to insure that no persons or animals fall into the pumping pit.

f. Sump Pumps and Priming Unit.

(1) The motor and pump bearings should be kept adequately lubricated. The pump shaft upper guide bearing is lubricated by a feed oiler and the lower bearing by a pressure grease fitting all accessible from the pump house operating floor. Before starting the pump, first check the status of the lubrication and where oilers are used or after initially filling delay start sufficiently to permit the lubricant to reach the bearings.

(2) Occasionally make a test run by opening the gate valve in one of the suctions branch lines, priming pump if required, to clear out the lines and to insure that the pump is operating properly. Should the pump fail to hold its prime adequately, check the foot valve and suction pipe connection for leakage. In case inadequate pumping capacity is indicated, check the suction screen and the discharge line for a possible restriction. During operation of the sump pump the pump may lose its prime when the water surface in the pumping pit has been lowered to the inlet of the suction pipe; however, by close watch on the part of the operator this condition can be avoided by opening the suction control valve to connect one of the other pumping pits with a higher water surface to the pump suction, sufficiently to maintain the required flow in the suction line.

(3) Suction Lines and Controls.

(a) At least once a year it is advisable to clean off accumulated rust and treat the surface where required in accordance with accepted practice for the type of materials and service. For steel water pipe refer to American Water Works Association Standard Specifications 7A.5 and 7A.6.

(b) Maintain the control valves in operable condition. Occasionally check the packing and replace with new packing whenever leakage cannot be prevented without excessive tightening of the packing gland. The valve control stand shall be kept adequately lubricated and any indication of abnormal force required to operate the stand control wheel to open or close the valve shall be investigated and necessary corrective action taken.

(4) Priming Unit.

Perform such maintenance as indicated on the inspection report or noted during the operation as being required with particular attention to lubrication and functioning of the motor pump unit. Where water cooling is employed insure that it is functioning properly. Insure that all pipe joints are tight and control valves including packing are functioning properly.

g. Pressure Water and Sanitary System.

(1) Pressure Water System.

(a) Maintain the pumping equipment and controls properly lubricated and in good operating condition. Should there be an indication of inadequate pumping capacity, carefully inspect the entire pumping system and perform any necessary maintenance. Insure that the pump and motor are properly lubricated and that the water cooling system where used is operating satisfactorily.

(b) Where improper functioning of the controls is indicated, make test operation by opening faucets to draw off enough water to lower the pressure and note point at which the pump starts, and with faucets closed note point at which it is stopped, making adjustments and repairs found required. Should the pump shut-off and come-on in short cycles, the air chamber at the top of the water storage tank has probably become water logged; in which case, stop the pump, reduce the pressure in the system, drain the tank sufficiently and admit air to the top of the tank, reseal top of tank, start pump to build up the system pressure and recheck functioning of the system.

(c) Give prompt attention to any leaks in the piping, faucets or other fixtures noted during the inspection of the water supply system. Keep all metal work clean of rust and painted in accordance with best practice, with particular attention to the pump itself.

(2) Sanitary System.

The septic tank should be inspected every six months and sludge removed when it has accumulated to around one-third the capacity of the tank or more frequent if conditions warrant. Any indication of abnormal slow drainage from the wash tubs or other fixtures should be investigated and corrective action taken to clear the pipes. When cleaning pipes use only approved pipecleaning tools such as: Flexible Coil Spring, Marco Hootnamx, Snakes, or Augers.

h. Pump Discharge Gates and Hoists.

The gates and hoist equipment shall be carefully inspected and carefully maintained. Any indication of binding misalignment, and/or abnormal force required to operate the hoisting equipment should be carefully investigated and the necessary maintenance performed.

(1) Slide Gates.

(a) Gate.

When the gate is accessible all anchor bolts should be checked for tightness. When tightening any of the bolt nuts, use a wrench of suitable size to avoid overstressing the threads or pulling the frame and guides out of alignment. It is advisable to occasionally remove the gate leaf when conditions permit, and thoroughly clean off all metal or other parts of the assembly, replacing excessively worn or otherwise deteriorated parts. Apply a suitable coat of preservative material before reinstalling. Coat the sliding surfaces including the seal bearing surfaces with waterproof grease. Also coat the gate leaf stem assembly including guides with a heavy coat of waterproof grease.

(b) Hoist.

1. Perform such maintenance as found to be required during the inspection. Keep the hoist screw, gears, and hoist stem well lubricated with a suitable waterproof grease. Should abnormal force be required to operate the hoist, check hoisting screw and nut, and if found advisable, disassemble, thoroughly clean with a suitable cleaning solvent, relubricate and assemble. If the parts are worn excessively replace the stem and nut with new parts. Application of grease to the section of the hoist stem projecting above the hoist may be objectionable due to accumulation of dust during the relative long periods between hoist operations, and if left unlubricated, inspect frequently; also it is advisable to apply a film of light lubricant to the stem and gears before hoist is operated.

2. The gate well access cover shall be adequately maintained at all times so as not to constitute a potential hazard. When wooden sections become loose and deteriorated, replace with first quality redwood and provide an adequate lock for the assembly to prevent removal by other than authorized persons. After maintenance and inspection operations are completed exercise special caution to insure that the covers are replaced and secured.

(2) Flap Gates.

(a) When practicable, carefully remove all rust from the metal work and repaint or otherwise coat with approved protective material. Should the hinge assembly become corroded or otherwise deteriorated to the point where replacement is required, it may be advisable to substitute stainless steel to whatever extent considered practical to minimize maintenance requirements. It would be well to apply a heavy coat of waterproof grease or suitable rust preventative to the hinge assembly.

(b) When the woodwork has become deteriorated to the point where replacement is justified replace with first quality redwood.

(c) For suitable protective coating for steel subject to constant immersion and abrasion refer to applicable American Water Works Association Standard Specifications and similar accepted sources for best approved practice.

i. Compressed Air System.

(1) Perform such maintenance as is indicated on the inspection report as being required with particular attention to the lubrication requirements and functioning of the pressure controls. Check the operation of the controls by bleeding off the air pressure until the compressor starts, and note the pressure build-up at the shut-off point and the time required for the build-up to the shut-off point. Before using the air pressure, especially for cleaning electrical equipment, first blow off the accumulated water and allow the controlled jet to exhaust until the air stream is dry.

(2) Thoroughly clean any rust spots developing on metal surfaces with wire brush and repaint as required.

j. Fire Protection Equipment.

For inspection and maintenance procedures relative to any fire protection equipment provided, refer to applicable provisions of "Recommended Good Practices of the National Board of Fire Underwriters," and applicable safety manuals. Where fire extinguishers are provided, insure that the proper type is being provided for the type of fire that might be expected in the particular area involved. Proper emphasis shall be directed to strictly enforce all fire prevention rules by frequent and careful inspections. No combustible materials shall be allowed to accumulate in the pumping plants. All equipment as well as the operating floor of the pump house shall be kept clean. Any rags, paper, etc. containing oil, paint or cleaning fluid shall not be allowed to accumulate - not even for a period of one day. Oil and grease dripping or other undesired accumulations shall be promptly removed. During any welding operations performed within a building be especially careful to remove or properly isolate any material that might be so ignited or damaged by the welding procedure. Take prompt corrective action relative to any electrical equipment which shows signs of sparking. Oil and grease shall be stored in approved containers and kept covered to exclude dirt. The outside of the container should be wiped clean of surplus oil or grease. Insure that the lubricant storage room is properly vented and that no oily rags, paper or like material is allowed to accumulate. Approved fire prevention instructions and warnings shall be properly posted.

k. Staff Gages.

Maintain these installations in a good state of repair. Any broken or damaged gages should be replaced or repaired at the earliest practical date. Keep well painted in accordance with the original contract specifications.

l. Pumping Plant Structure.

(1) At least once each year thoroughly inspect the entire structure and perform any required maintenance to restore to its original condition insofar as can be justified. All items missing, broken, or deteriorated, including purely decorative items, such as tile trim on roof, should be noted.

(2) When inspecting the structure give particular attention to condition of the doors, windows, roof, cracks in walls and/or foundations and all painted surfaces.

SECTION IV

REPAIR OF DAMAGE TO PROJECT WORKS AND METHODS OF COMBATING FLOOD CONDITIONS

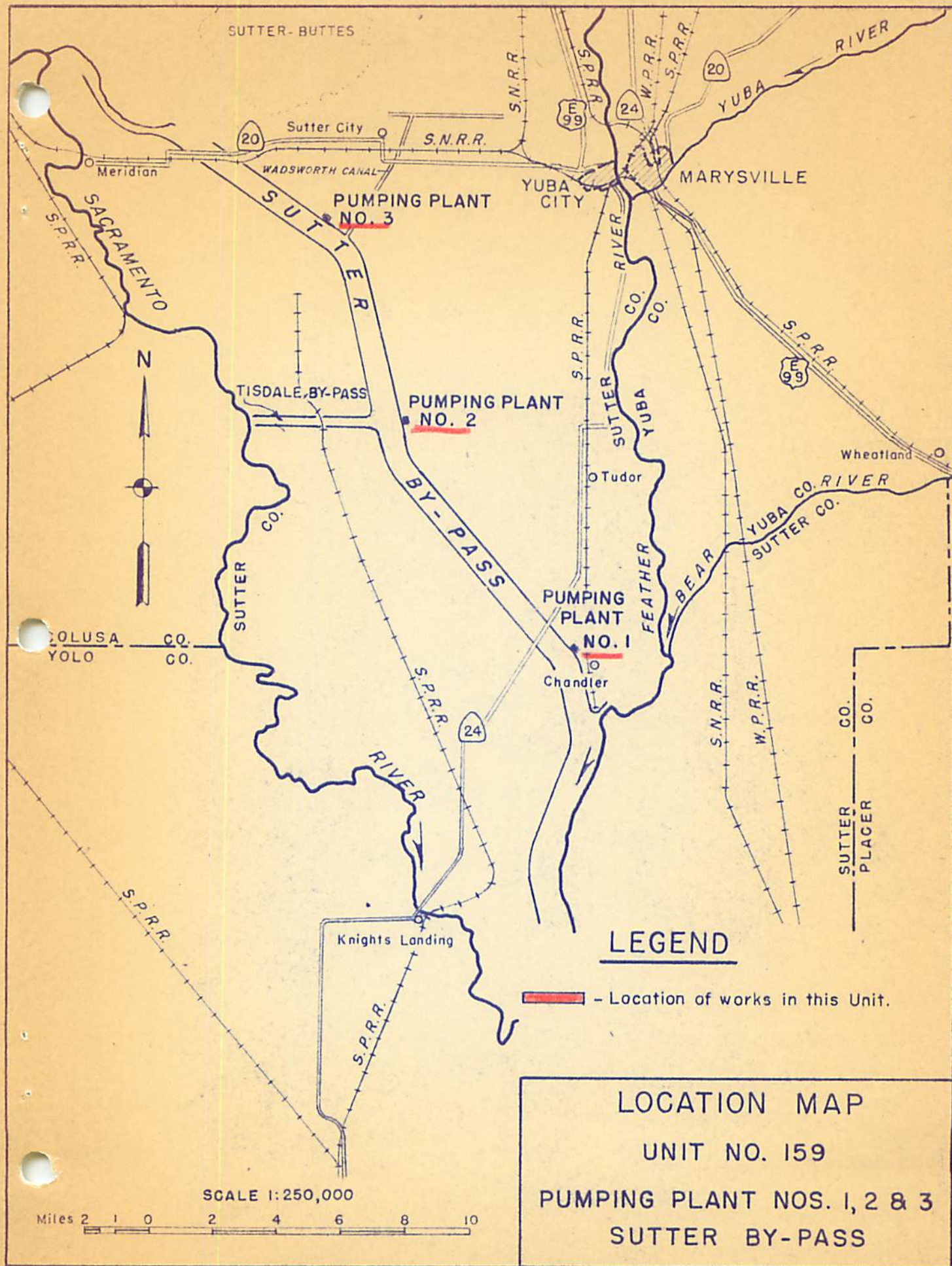
4-01. Repair of Damage. In the event of serious damage to the project works, whether due to flood conditions or other causes, and which may be beyond the capability of local interests to repair, the Superintendent will contact a representative of the Division of Water Resources, State of California, who coordinates maintenance of project works of the Sacramento River Flood Control Project. The State representative will give assistance or advice, or will determine appropriate action to be taken.

4-02. Applicable Methods of Combating Floods. For applicable methods of combating flood conditions reference is made to Section VIII of the Revised Standard Manual, where the subject is fully covered.

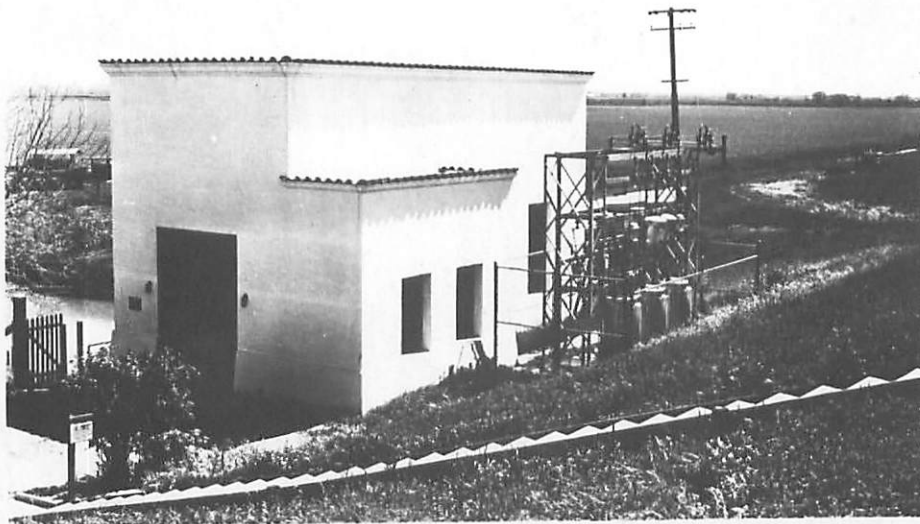
EXHIBIT A

**FLOOD CONTROL REGULATIONS
(See Standard Manual)**

**EXHIBIT A
Unattached**



PUMPING PLANT No. 1



SUTTER BYPASS

Fig. 2

PUMPING PLANT NO. 1



Fig. 3

SUTTER BYPASS

EXHIBIT A-2
SHEET 2 of 4

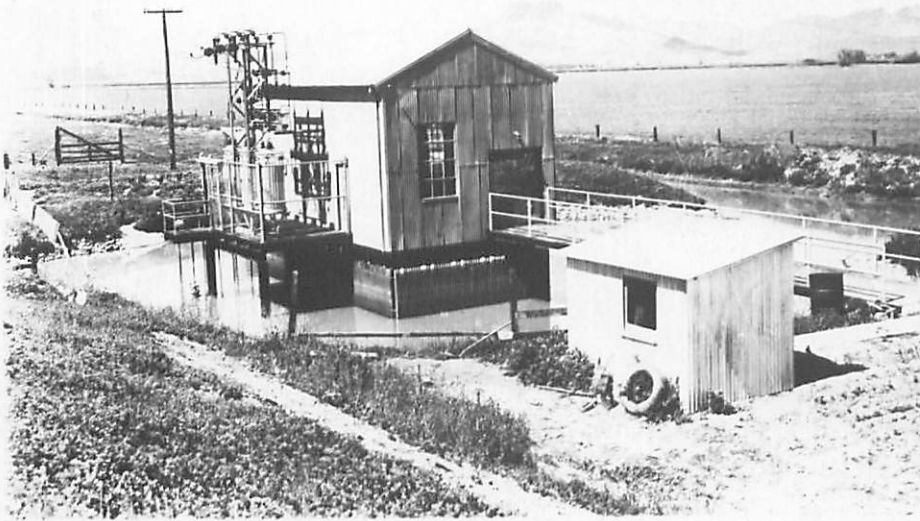


Fig. 4

SUTTER BYPASS

EXHIBIT A-2
SHEET 3 of 4

PUMPING PLANT No. 3



SUTTER BYPASS

EXHIBIT A-2
SHEET 4 of 4

Fig 5

EXHIBIT B

"AS CONSTRUCTED DRAWINGS"

See separate folder for the following drawings

| <u>Drawing No.</u> | <u>Title</u> | |
|--------------------|-----------------------------------|----------|
| 50-25-1445-1 | Sutter Bypass Pumping Plant No. 1 | 7 sheets |
| 50-25-1446-1 | Sutter Bypass Pumping Plant No. 2 | 6 sheets |
| 50-25-1447-1 | Sutter Bypass Pumping Plant No. 3 | 1 sheet |
| 50-25-1473 | Vicinity Map | 1 sheet |

SHOP DRAWINGS

| | | |
|------------|--------------------|----------|
| 50-17-2123 | Electrical Details | 8 sheets |
|------------|--------------------|----------|

Other drawings are available in the Office of the District Engineer,
Corps of Engineers, Sacramento, California.

EXHIBIT B
Unattached

EXHIBIT C

PLATES OF SUGGESTED FLOOD FIGHTING METHODS
(See Standard Manual)

EXHIBIT C
Unattached

EXHIBIT D

CHECK LIST NO. 1

LEVEE INSPECTION REPORT

(See Standard Manual)

**EXHIBIT D
Unattached**

EXHIBIT E

**CHECK LISTS OF LEVEES
CHANNELS AND STRUCTURES**

LIST OF EQUIPMENT AND NAME PLATE DATA

For definition of "flood" or "highwater" period,
See paragraph 1-05 of this manual

EXHIBIT E

CHECK LIST NO. 2
UNIT NO. 159

Inspector's Report Sheet No. _____

Inspector _____

Date _____

Superintendent _____

| Item | Remarks |
|--|---------|
| (a) Location by Station | |
| (b) Settlement, sloughing, or loss of grade | |
| (c) Erosion of both levee slopes | |
| (d) Condition of roadways, including ramps | |
| (e) Evidence of seepage | |
| (f) Condition of farm gates and fencing | |
| (g) Maintenance measures taken since last inspection | |
| (h) Comments | |

INSTRUCTIONS FOR COMPLETING SHEET 1, EXHIBIT E
(To be printed on back of Sheet 1)

- Item (a) Indicate levee station of observation, obtained by pacing from nearest reference point; indicate right or left bank.
- Item (b) If sufficient settlement of earthwork has taken place to be noticeable by visual observation, indicate amount of settlement in tenths of a foot. If sloughing has caused a change in slope of the embankment sections, determine the new slope. Note areas where erosion or gulying of the section has occurred.
- Item (c) If sufficient erosion or gulying of back face of back toe of levee has taken place to be noticeable by visual inspection, indicate area affected and depth.
- Item (d) Note any natural change in any section of roadway or ramps. Indicate any inadequacy in surface drainage system.
- Item (e) Indicate any evidence of seepage through the embankment section.
- Item (f) Indicate the serviceability of all farm gates across the embankments and roadway, and indicate if repainting is required.
- Item (g) Indicate maintenance measures that have been performed since last inspection and their condition at the time of this inspection.
- Item (h) Record opinion, if any, of contributory causes for conditions observed and also any observations not covered under other columns.

NOTE: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion, and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

CHECK LIST NO. 3

CHANNEL AND RIGHT-OF-WAY

UNIT NO. 159

Inspector's Report Sheet No. _____ Inspector _____

Date _____ Superintendent _____

| Item | Remarks |
|--|---------|
| (a) Name of channel and location by stations | |
| (b) Vegetal growth in channel | |
| (c) Debris and refuse in channel | |
| (d) New construction within right-of-way | |
| (e) Extent of aggradation or degradation | |
| (f) Condition of riprapped section | |
| (g) Condition of bridges | |
| (h) Measures taken since last inspection | |
| (i) Comments | |

INSTRUCTIONS FOR COMPLETING SHEET 3, EXHIBIT E

(To be printed on back of Sheet 3)

- Item (a) Indicate station of observation obtained by pacing from nearest reference point.
- Item (b) Note nature, extent, and size of vegetal growth within the limits of flood flow channel.
- Item (c) Note nature and extent of debris and refuse that might cause clogging of the conduits of the irrigation intake works, fouling of the tainter gates, or the bridges over the channel.
- Item (d) Report any construction along the diversion channel or above the diversion works that has come to the attention of the inspector and that might affect the functioning of the project.
- Item (e) Indicate any change in grade or alignment of the channels, either by deposition or sediment or scour, that is noticeable by visual inspection. Estimate amount and extent.
- Item (f) Indicate any change that has taken place in the riprap such as disintegration of the rock, erosion, or movement of the rock. Note the presence of vegetal growth through the riprap.
- Item (g) Note any damage or settlement of the footings of the bridges. Indicate condition of wooden structures and if repainting is required. Indicate condition of bridge approaches, headwalls, and other appurtenances.
- Item (h) Indicate maintenance measures that have been performed since the last inspection and their condition at time of this inspection.
- Item (i) Record opinion, if any, of contributory causes for conditions observed, also any observations not covered under other columns.

NOTE: One copy of the Inspector's Report is to be mailed to the District Engineer immediately on completion and one copy is to be attached to and submitted with the Superintendent's semi-annual report.

EXHIBIT E

Sutter Bypass Pumping Plant No. 1

List of Equipment and Name-plate Data

Unit No. 159

Pump No. 1: Worthington Centrifugal Pump 28 MS. Serial No. 920447.
GPM 16,100. RPM 350. Head Ft. 15. Driver HP 52.6

Motor: G.E. Induction Motor. Serial No. 96E317G1. Frame 564.
Type KT. Volts 2200. F.L. Amps. 16.6, 3 phase, 60 cycles.
Speed Full Load 350. HP 52.6 continuous 40° C rise.
No. 5363560.

Pump No. 2: Worthington Centrifugal Pump 36 MS. Serial No. 920448
GPM 23,300. RPM 317. Head Ft. 13. Driver HP 76.1.

Motor: G. E. Induction Motor. Serial No. 97 E 116 GI. Frame 574.
Type KT. Volts 2200. F.L. Amps. 23.7. 3 phase, 60 cycles.
Speed Full Load 320. HP 76.1 continuous 40° C rise.
No. 5363561.

Pump No. 3: Byron Jackson, Centrifugal Pump. Type No. 98803. 42" Vert.
Propeller 36-1/2".

Motor: G. E. Induction Motor No. 4947956. Type KT-422Y-24-300-300.
Form V. Volts 2200, 60 cycles, Amps. 80. HP 300. Speed Full
Load 288., 300 HP continuous 50° C rise.

Pump No. 4: Worthington Centrifugal Pump 36 MS. Serial No. 920449.
GPM 23,300. RPM 316., Head Ft. 13., Driver HP 76.1.

Motor: G. E. Induction Motor. Serial No. 97E116GI Frame 574.
Type KT. Volts 2200. F.L. Amps. 23.7. 3 phases, 60 cycles.
Speed Full Load 320. HP 76.1. Continuous 40°C rise.
No. 5363570.

Sump Pump: Worthington, Size 8-FJI, No. 520486. G.E. Induction Motor
No. 5378803. Model No. 5KF6304-AEI. Frame No. A6304.
Type KF. Volts 220/440. F.L. Amps 31/15-1/2. 3 phase,
60 cycles. Speed F.L. 580. HP 10. Service Factor 1.15 at
rated voltage and cycles.

Primer Pump: Nash Hytor Vacuum Pump. Nash Engineering Co. South
Norwalk, Conn. Size AL-672. Test No. A2918. AMP 1750.

Motor: G. E. Induction Motor. Model No. 5K225A2. Volts 220/440. Frame 225. Type K. 60 cycles. 3 phase. 2 HP, 5.6/2.8 Amps. Speed F.L. 1740 RPM. Serial No. 5345740.

Crane: One Judson Pacific Co. Hand-operated Crane 8-ton capacity.

Control gates at Conduit Discharge: 3-slide gates and hoists. Hand-operated hoists C. D. Butchard Co., Denver, Colorado.

Main Switchboard: Consists of 6 panels, G.E. CR7890Y1, 2200 Volts, 3 phase, 60 cycles. Diagram P-5167562.

Panel No. 1: Incoming line panel.

Mounted on front of panel: Voltmeter, Voltmeter Switch, Oil Circuit Breaker Lever Mechanism. Mounted on top of the panel 3-single pole, single throw, hook stick operated disconnect switches, 5KV, 400 Amp., rear connected.

Mounted in rear of panel: Oil circuit breaker, type FK-33; 2-current transformers; 2-potential transformers.

Panel No. 2: Induction Motor control panel-Unit #4.

Mounted on front of panel: Ammeter, start-stop Push-Button station and thermal overload relay, hand reset, with glass enclosing case. Mounted on top of panel: 3-S.P.S.T. 200 amp., 5 KV, disconnect switches, rear connected, hook stick operated.

Mounted in rear of the panel: 3 pole, 2300 Volt, 75 amp, oil immersed line contactor, 2 current transformers for operation of overload relay and ammeter.

Panel No. 3: Induction motor control panel-Unit No. 3, G. E. CR1034-K21 Starting Compensator No. BL 2889746-G2, 300 HP, 2200 Volts.

Mounted on front of panel: Ammeter, "OFF-START-RUN" compensator operating lever, temperature overload relay-hand reset. Mounted on top of panel: 3-S.P.S.T., 200 Amp., 5KV, disconnect switches, rear connected, hook stick operated.

Mounted in rear of the panel: 3-current transformers, one for ammeter and two for operation of thermal overload relay. 1-potential transformer for operation of low-voltage release relay. 1 low-voltage release relay. 1 motor starting compensator with external auto transformer.

Panel No. 4: Induction motor control panel-Unit No. 2. Equipment is the same as on Panel No. 2.

Panel No. 5: Induction motor control panel-Unit No. 1. Equipment is the same as on Panel No. 2.

Panel No. 6: Auxiliary Power and Lighting Panel Mounted on front of panel:
1-2 pole, 50Amp., 250 Volt air circuit breaker for station lights.
1-2 pole, 50Amp., 250 Volts air circuit breaker for house lights.
1-3 pole, 50Amp., 250 Volts air circuit breaker for sump pump.
1-3 pole, 50Amp., 250 Volts air circuit breaker for priming pump.
1-Start-Stop push-button station for sump pump.
5-2 pole, 15Amp., 120 Volt air circuit breakers for heaters -
4 for motors and 1 for switchboard.
1-Start-Stop push-button station for priming pump.
1-8 circuit, 3-wire lighting panel board.

Mounted in rear of the panel: 1-G. E. Magnetic switch CR7006-D30B, Cat. No. 431269G103, 220 V., 60 cycles with temperature overload relay-hand reset, for sump pump. 1-G. E. Magnetic switch CR7006-D40H, Cat. No. 3885849G103, 220 V., 60 cycles with temperature overload relay-hand reset, for sump pump primer motor.

Miscellaneous Equipment:

1-Fuse disconnect rod, wood, 12'-6" long.
1-Fuse disconnect rod, wood, 1' long.
1-Wrench, 42".
1-Grease gun, hand pressure, mounted on wheels, Alemite #65862.
1-Fire Extinguisher, Essanay 2-1/2 gal.
1-Bell, telephone extension, W.E. 8".

Slide Gates:

Slide gates with manual operated screw hoists in pump discharge conduits. C. D. Butchart Co., Denver, Colorado.

Flap Gates: Flap gates installed at the levee end of the pump discharge conduits. Top-hinged swing type.

Spare Parts: 2 sets fuse cutouts
5 sets link belt fuses
5 lightning arresters
1 set of contactors for oil switches
Quantity of spare lamps

EXHIBIT E

Sutter Bypass Pumping Plant No. 2

Description of Equipment and Name-plate Data

Unit No. 159

Pump No. 1: Worthington 56" MS-1 Vertical Volute Pump.

Motor: G. E. Synchronous, Frame 7695, Type TS, Form V, 3 phase, 60 cycles, 2200 Volts, 53.8 Amps., 171.3 RPM, Excitation Volts: 125, Amps.: 41.0, 253 HP, 1.0P. F., Cont. 40° C. rise, Motor No. 5370712.

Pump No. 2: Worthington 56" MS-1 Vertical Volute Pump.

Motor: G. E. Synchronous, Frame 7695, Type TS, Form V, 3 phase, 60 cycles, 2200 Volts, 53.8 Amps., 171.3 RPM, Excitation Volts: 125, Amps.: 41.0, 253 HP, 1.0 P. F., Cont. 40° C rise, Motor No. 5370713.

Pump No. 3: Worthington 36" MS-1 Vertical Volute Pump.

Motor: G. E. Synchronous, Frame 7663, Type TS, Form V, 3 phase, 60 cycles, 2200 Volts, 27 Amps., 300 RPM, Excitation Volts: 125, Amps.: 19.2 127 HP, 1.0 P. F., Cont. 40° C rise, Motor No. 5370711.

Pump No. 4: Worthington 56" MS-1 Vertical Volute Pump.

Motor: G. E. Synchronous, Frame 7695, Type TS, Form V, 3 phase, 60 cycles, 2200 Volts, 62 Amps., 180 RPM, Excitation Volts: 125, Amps.: 41.0, 293 HP, 1.0 P. F., Cont. 40° C rise, Motor No. 5370715.

Pump No. 5: Same as Pump No. 4.

Motor: Same as No. 4. Motor No. 5370714.

Motor - Generator Set No. 1

Motor: G. E. Induction Motor No. 5373660, Model 5K-364-B-19, Frame 364S, Type K, Volts: 220/440, F. L. Amps.: 50/25, 3 phase, 60 cycles, Speed F. L. 1755 RPM, 20 HP, Cont. 40° C rise.

D. C. Generator: G. E. Model No. 49A639, Type CD75, Form AL, Compound Wound, Volts: 125/125, 100 Amps, 1755 RPM, 12-1/2 KW, Cont. 40° C rise, No. 1697210.

Motor - Generator Set No. 2

Motor: Same as in Set No. 1 Motor No. 5373661.

D. C. Generator: Same as in Set No. 1 Generator No. 1697211.

Sump Pump: Worthington Size 8-FJ1, No. 520487.

Motor: G. E. Induction, Model 5KF-6304-AE1, Frame A6304, Type KF, 220/440 Volts, 31/15-1/2 Amps., 3 phase, 60 cycles, 580 RPM, 10 HP, Cont. 40° C rise, Motor No. 5378804.

Sump Pump Primer Pump: Nash Hytor, Size AL-672, Test No. A2917, 1750 RPM.

Motor: G. E. Induction, Model 5K225A2, Frame 225, Type K, 220/440 Volts, 5.6/2.8 Amps., 3 phase, 60 cycles, 2 HP, Speed F. L. 1740 RPM, Motor No. 5344450.

Compressor: Worthington, Size BL11000, No. 42530.

Motor: G. E. Induction, Model 5KF324B2, Frame 324, Type KF, 220/440 Volts, 27.1/13.6 Amps., 1750 RPM, 3 phase, 60 cycles, 10 HP, Motor No. 5494946.

Automatic Pressure Switch: G. E. Cat. No. 2248288G20, CR2927M29, Permissible max. operating pressure 80 lbs.

Main Switchboard consists of 8 panels G. E. CR7890-Y1, Cat. No. 4987072, 2200 Volts, 3 phase, 60 cycles, Diagram P. P. 5163963.

Panel No. 1: Incoming line panel.

Mounted on front of panel: Power Factor Meter, Voltmeter, Voltmeter Switch, Recording Voltmeter, Oil Circuit Breaker Lever Mechanism.

Mounted on top of the panel: 3-single pole, single throw, hook stick operated disconnect switches, 5KV, 600 Amp., rear connected.

Mounted in rear of panel: Oil circuit breaker, Type FK-35, 2-current transformer, 2-potential transformers.

Panel No. 2: Synchronous motor control panel - Unit No. 5.

Mounted on front of panel: Line Ammeter, Field Ammeter, Field Rheostat Mechanism, Power Factor Field Removal Relay, Start-Stop Push-Button Station, 1-Indicating light, and Thermal Overload Relay, hand reset with glass cover.

Mounted on top of panel: 3-S.P.S.T., 200 Amp., 5 KV, disconnect switches, rear connected, hook stick operated.

Mounted in rear of panel: 2 pole field contactor with normally closed auxiliary pole for field discharge resistor; slip frequency relay; motor line contactor; field discharge resistor; field rheostat; 2 current transformers for operation of overload relays and ammeter.

Panel No. 3: Synchronous motor control panel - Unit No. 4. Equipment is the same as on panel No. 2.

Panel No. 4: Synchronous motor control panel - Unit No. 3. Equipment is the same as on panel No. 2.

Panel No. 5: Synchronous motor control panel - Unit No. 2. Equipment is the same as on panel No. 2.

Panel No. 6: Synchronous motor control panel - Unit No. 1. Equipment is the same as on panel No. 2.

Panel No. 7: A.C. side of 2 exciter motor-generator sets, sump pump and sump pump primer motor starters, air compressor motor starter, 220/110 volt single phase lighting circuits.

Mounted on front of panel: 2-Air circuit breakers, 3 pole, 250 volt, 100 Amp. frame, for A. C. side of exciters No. 1 and No. 2.
1 - Air circuit breaker 2 pole, 250 volt, 50 amp. frame for switchboard heaters.
1 - Air circuit breaker 2 pole, 250 volt, 50 amp. frame for house lights.
1 - Air circuit breaker 3 pole, 250 volt, 50 amp. frame for sump pump.
1 - Air circuit breaker 3 pole, 250 volt, 50 amp. frame for sump primer pump.

Mounted on front of panel (Cont'd.): 1 air circuit breaker 3 pole, 250 volt, 50 amp. frame for station lights and auxiliary power.

1 - Panel type start-stop push-button station for air compressor.

1 - Panel type start-stop push-button station for sump pump.

1 - Pump type start-stop push-button station for sump primer pump.

1 - Trumbull Electric 8 circuit lighting panel.

Mounted in the rear: 1 - G. E. Magnetic switch CR-7006-D30B, Cat. #4381269G103, 220 volts, 60 cycles, for sump pump.

1 - G. E. Magnetic switch CR-7006-D40H, Cat. #3885849G103, 220 volts, 60 cycles, for sump primer pump.

1 - G. E. Magnetic Switch CR-7006-D30AA, 220 volts, 60 cycles, Cat. #2241790 for air compressor.

Panel No. 8: D. C. side of 125 volt exciter generators.

Mounted on front of panel: 2 - D. C. Ammeters

2 - D. C. Voltmeters

2 - Field rheostat mechanisms

2 - Air circuit breakers, 3 pole, 125 volts, D. C., 100 amp. for D. C. side of exciter sets No. 1 and No. 2.

5 - Korndorffer Starting Panels for Synchronous Motor Control - G. E. CR-7890-Y1 Cat. #8022897, 2200 volts, max. pri. amps. 200, 3 phase, 60 cycles. Diagram P-694460. All equipment is mounted in the rear of the panel consisting of 2 oil immersed contactors CR-2810-1281A; overvoltage auto transformer and 2 auxiliary relays.

Miscellaneous Equipment: 1 - Hand operated traveling chain hoist, 10 ton, Judson Pacific Co.

1 - Fuse disconnect rod 14 ft. long.

1 - Fuse disconnect rod 4 ft. long.

1 - Grease gun, hand pressure, Alemite #65851.

1 - Fire extinguisher Essanay, 2-1/2 gal.

2 - 20 ft. straight ladders.

2 - 8 ft. step folding ladders.

8 - Gate valves, screw type, Crane, 16".

1 - Gate valves, screw type, Crane, 24".

1 - Telephone extension bell, double, W. E. 8".

3 - 50 ft. electric extension cord.

Spare Parts: 1 - Top bearing for large motors..

5 - Fuse Cutouts.

1 - Box of brushes for synchronous motors collector rings.

1 - Set of contactors for oil switches.

Quantity of spare lamps.

Slide Gates: Slide gates with manual operated screw hoists in the pump discharge conduits. C. D. Butchart Co., Denver, Colorado.

Flap Gates: Flap gates installed at the levee end of the pump discharge conduits. Top hinged swing type.

EXHIBIT E

Sutter Bypass Pumping Plant No. 3

Description of Equipment and Name-plate Data

Unit No. 159

Pump No. 1: Worthington, 30 cfs, No. 920561.

Motor: G. E. Induction, Frame 546 V, Type KT, Serial No. 5372957, 3 phase, 60 cycles, 440 volts, F. L. Amps. 60.4 speed 500 RPM, 39.6 HP.

Pump No. 2: Worthington, 60 cfs, No. 920564.

Motor: G. E. Induction, Frame 566 V, Type KT, Serial No. 5363564, 3 phase, 60 cycles, 440 volts, F. L. Amps. 120, speed 350 RPM, 79.2 HP.

Pump No. 3: Worthington, 60 cfs, No. 920563.

Motor: G. E. Induction, Frame 566 V, Type KT, Serial No. 5363565, 3 phase, 60 cycles, 440 volts, F. L. Amps. 120, speed 350 RPM, 79.2 HP.

Pump No. 4: Worthington, 30 cfs, No. 930562.

Motor: G. E. Induction, Frame 546 V, Type KT, Serial No. 5372958, 3 phase, 60 cycles, 440 volts, F. L. Amps. 60.4, speed 500 RPM, 39.6 HP.

Main Switchboard: 5 panels, G. E. CR7890Y1, 440 volts, 3 phase, 60 cycles, Diagram M-5196044.

Panel No. 1: Incoming line panel.

Mounted on front of panel: Voltmeter, Voltmeter switch.

1 - Main air circuit of breaker, 3 pole, 600 A. frame, 600 volts.

1 - Air circuit breaker, 2 pole, 50 A. frame, 600 volts, for lighting circuit transformer.

Mounted in rear of panel: 2 KVA, single phase, 60 cycle, dry type voltage transformer, 480/120 volts.

2 - Potential transformers with fuse blocks and fuses.

Panel No. 2: Induction motor control panel-Unit No. 4.

Mounted on front of panel: Ammeter.

- 1 - Air circuit breaker, 3 pole, 100 A. frame, 600 volts, for motor circuit protection.
- 1 - Start-Stop push-button station.
- 1 - Thermal overload relay.

Mounted in rear of panel: 1 - Current transformer.

- 1 - Magnetic line starter.

Panel No. 3: Induction motor control panel-Unit No. 3 Equipment is the same as in panel No. 2 with exception of air circuit breaker which is 225 A. frame.

Panel No. 4: Induction motor control panel-Unit No. 4 Equipment is the same as in panel No. 3.

Panel No. 5: Induction motor control panel-Unit No. 1 Equipment is the same as in panel No. 2.

Miscellaneous equipment: 1 - Traveling chain hoist, 5 ton, Yale.

- 1 - 12 ft. straight ladder.
- 1 - Electric heater, 1650 W, 115 V., Thermador.
- 1 - Fire extinguisher, Essanay, 2-1/2 gal.
- 1 - Bell, telephone extension, Holtzer-Cabot, 6".
- 1 - Gate Valve, screw type, syphon, 24".

Slide Gates: Slide gates with manual operated screw hoist installed in the pump discharge conduits, C. D. Butchart Co., Denver, Colorado.

Flap Gates: Flap gates installed at the levee end of the pump discharge conduits, Top swing type.

EXHIBIT E

Mechanical Electrical Equipment

Inspection Check List

Unit No. 159

PROJECT: Sutter Butte Canal Pumping Plants Nos. 1, 2, and 3

INSPECTOR: _____

DATE: _____

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|--|-------------------------|----------------|---------------------------------------|
| 1. <u>Main Pumps-Motor Units</u> | | | |
| a. Pumps | | | |
| (1) <u>Lubrication</u> | Twice daily | | |
| Adequacy. | | | |
| Functioning of oiling system. | | | |
| Condition of lubrication lines fittings, pipe, anchors, etc. | | | |
| Adequacy of supply of supply of lubricant on hand. | | | |
| (2) <u>Functioning of Pump</u> | | | |
| Smoothness of operation unusual vibration and/or noise. | | | |
| | day | | |
| Pump RPM. | 3 months | | |
| Capacity. | 6 months | | |
| Drive shaft vibration when running. | | | |
| | day | | |
| Bearing wear | 6 months | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|-------------|-------------------------------|----------------|---|
|-------------|-------------------------------|----------------|---|

(3) Adjustment

year

Check clearance between
bearing, sleeve & bushing.

Check clearance between
wearing rings.

Miscellaneous

(4) Condition of Pump

| | |
|----------------------------|-------|
| Bearings | year |
| Drive shaft | month |
| Drive shaft connections | month |
| Condition of wearing rings | year |
| Adjustment of impeller | year |
| Grease packing rings | year |

(5) Pump anchorage

week

(6) Debris in pumping pit
around pump suction etc.

day

(7) Discharge line

| | |
|-------------------------|-------|
| Pipe flange connections | month |
| Check valve functioning | month |

(8) Condition of metal work

6 months

(9) Miscellaneous

b.. Pump Motor

(1) Lubrication

| | |
|----------|-----|
| Adequacy | day |
|----------|-----|

| | |
|---------------------------------------|-----|
| Bearing temp. noise vibration etc. | day |
|---------------------------------------|-----|

| | |
|--|-----|
| Functioning of bearing feed oiler, and oil level. | day |
|--|-----|

| | |
|--|-----|
| Lubricant piping, fittings, reservoir, etc. | day |
|--|-----|

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|--|-------------------------|----------------|---------------------------------------|
| Note signs of oil leakage at any point. | day | | |
| Inspect birdscreens. | day | | |
| (2) <u>Motor Operation</u> | | | |
| Note any indication of excessive Temp. rise under load. | day | | |
| Abnormal vibration and/or noise | day | | |
| Check function of motor controls. | day | | |
| Note any failure of motors to pull in throughout the load range. | day | | |
| Sparkings at brushes, brush excessive wear, etc. | week | | |
| Inspect for moisture inside the motor housing. | week | | |
| Check functioning of electric heaters. | week | | |
| Motor base anchorage | month | | |
| (3) <u>Drive shaft & coupling</u> | | | |
| Inspect for functioning and condition. | month | | |
| (4) Note accumulations of oil and or water on or around the motor. | day | | |
| (5) <u>Metal Work</u> | | | |
| Note rust spots wear and condition of paints. | 6 months | | |

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|---|-------------------------|----------------|---------------------------------------|
| (6) <u>Spare Parts</u> | | | |
| Adequacy of supply | 3 months | | |
| (7) <u>Irrigation Period</u> | | | |
| Blocking of rotors | | | |
| 2. <u>Electrical System</u> | | | |
| a. Transformers | | | |
| (1) <u>Transformer Oil</u> | | | |
| Oil level and temp. | 6 months | | |
| Air temp. and load condition | 6 months | | |
| Test oil for need for filtering. | 2 years | | |
| (2) <u>Inclosure & Pad</u> | | | |
| Note debris on transformers and in the station inclosure that should be removed. | day | | |
| Inspect fence including for need for maintenance. Also check gate lock. | month | | |
| (3) Note any indication of abnormal temp. rise and noise coming from the transformers. | day | | |
| b. Outside Switching | | | |
| <u>Equipment</u> | | | |
| (1) Note dust, etc., accumulated on insulators and switch gear. | month | | |

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|---|--------------------------|----------------|---------------------------------------|
| (2) Inspect all grounds. | week | | |
| (3) Check supply of spare fuses. | month | | |
| (4) Note any damaged insulators. | day | | |
| (5) Note any unusual noise originating with insulators, switch gear, etc. | day | | |
| (6) Carefully inspect the entire installation after a storm. | - | | |
| (7) Lightning arresters | month and after storm | | |
| (8) Miscellaneous | | | |
| c. Main Switch Board | | | |
| (1) Inspect all equipment and note need for cleaning. | week | | |
| (2) Check switches and con- trols to insure that they are mechanically operable. | month | | |
| (Note indications of sluggish operation or sparking.) | | | |
| (3) Note any instruments such as meters, recorders, etc., which are not registering properly. | day | | |
| (4) Check supply of recording charts and need for chang- ing chart. | week | | |
| (5) Inspect for indications of: | day | | |
| Loose connections. | | | |
| Insulation deterioration. | | | |
| Unusual odors. | | | |
| Mechanical failures. | | | |

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|---|-------------------------|----------------|---------------------------------------|
| (6) Report any failure of the controls to control the operation of the units for which they are intended. | day | | |
| (7) Inspect relays etc., making full use of Mfgs. descriptive data. | year | | |
| (8) <u>Circuit Breakers</u> | year | | |
| Condition of oil | | | |
| Condition of contacts | | | |
| Functioning of the operating mechanism | | | |
| Lubrication of pins and bushings | | | |
| Tightness of bolts, nuts, cotters, etc. | | | |
| Evidence of heating | | | |
| Condition of bushings | | | |
| Miscellaneous | | | |
| (9) <u>Starters</u> | month | | |
| Check all connections. | | | |
| Check to insure that all moving parts move freely. | | | |
| Check adjustment and condition of contact tips. | | | |
| Check functioning of start and stop buttons and overload relay. | | | |
| Miscellaneous | | | |

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|-------------|-------------------------|----------------|---------------------------------------|
|-------------|-------------------------|----------------|---------------------------------------|

(10) Contactors

Check for proper functioning, including opening and closing operation.

Inspect contacts.

Check adjustment of contact gap.

Check contact pressure.

Miscellaneous

d. Motor Generator Sets Plant No. 2

(1) Motor

Adequacy of bearing day lubrication day

Note any indication of bearing heating or noise. day

Inspect motor anchorage. day

Inspect drive shaft coupling. day

Check motor for smoothness of operation and proper functioning of the controls. day

(2) Exciter

Check operation by start and run test. 3 months

Functioning day

Inspect the exciter brushes for wear and adjustment. 6 months

Check commutator. 6 months

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|---|-------------------------|----------------|---------------------------------------|
| Note signs of overheating, wear, etc. | day | | |
| Note any unusual noise while operating. | day | | |
| Check anchor bolts. | day | | |
| Inspect metal work. | 3 months | | |
| (3) <u>Rheostat</u> | | | |
| Functioning | day | | |
| Condition of contacts | 3 months | | |
| Inspect all connections. | 6 months | | |
| 3. Miscellaneous | | | |
| (1) <u>Water Pressure System</u> | | | |
| Check automatic controls for proper functioning. | month | | |
| Check electric motors and note need for lubrication or other maintenance. | week | | |
| (2) <u>Lighting System</u> | | | |
| Check light fixtures and controls for proper functioning. | week | | |
| Check adjustment of flood lights. | month | | |
| Inspect circuit breakers. | month | | |
| Check supply of fuses and light bulbs on hand. | month | | |
| (3) <u>Pump Motor Controls</u> | | | |
| Check the entire electric system provided for operat- ing the main pumping units. | year | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|---|-------------------------------|----------------|---|
| (4) <u>Power Supply</u> | | | |
| Generally inspect the Power Co.'s transmission line installations in the vicinity of the pumping plant. | month | | |
| (5) <u>Miscellaneous</u> | | | |
| 3. <u>Cranes</u> | | | |
| Check functioning of controls. | 3 months | | |
| Inspect condition of lubrication. | 6 months | | |
| Check shaft bearings. | 6 months | | |
| Inspect hoist rope for wear, rust, etc. | year | | |
| Check trolley and carriage rail; anchorage. | 6 months | | |
| 4. <u>Trash Racks</u> | | | |
| Condition of metal work | year | | |
| Anchorage | year | | |
| Note debris in rack and pool that should be removed. | day (during plant operation). | | |
| 5. <u>Stop Logs</u> | | | |
| Check condition. | 3 months | | |
| Check receiving slots, etc., for debris that might restrict lowering of logs. | Before installation | | |
| Inspect cover plate and guard installation. | After installation | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|--|-------------------------------|----------------|---|
| 6. <u>Sump Pumps and Priming Units</u> | | | |
| a. Sump Pumps | | | |
| (1) Check gate valve control pedestals for operation and need for lubrication. | 3 months | | |
| (2) Inspect suction lines for leakage. | 3 months | | |
| (3) Note any indication that foot valves are not functioning properly. | 3 months | | |
| (4) Check suction screens for possible obstruction. | year | | |
| (5) Check pump for proper operation. | 3 months | | |
| (6) Check adequacy of lubrication, etc. | month and before starting | | |
| (7) Inspect all anchor bolts. | month | | |
| (8) Miscellaneous | - | | |
| b. Priming Unit | | | |
| (1) Check for proper functioning. | 3 months | | |
| (2) Check lubrication and water cooling of pump and motor. | month and before use | | |
| (3) Miscellaneous | | | |
| 7. <u>Pressure Water and Sanitary Systems</u> | | | |
| a. Pressure Water System | | | |
| (1) Check mechanical functioning of automatic controls. | week | | |
| (2) Check pump and motor for operation and adequacy of lubrication. | week | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|---|-------------------------------|----------------|---|
| (3) Inspect all water lines and fixtures for leaks. | month | | |
| (4) Miscellaneous | | | |
| b. Sanitary System | | | |
| (1) Note any indication that drain lines are restricted. | month | | |
| (2) Inspect septic tank and note need for cleaning or other maintenance. | 6 months | | |
| 8. <u>Pump Discharge Gates and Hoists</u> | | | |
| a. Slide Gates | 6 months | | |
| (1) <u>Gates</u> | | | |
| Check condition of metal work, etc. | | | |
| Check anchor and connections for tightness and wear. | | | |
| Inspect seal bearing surfaces for condition and need for lubrication. | | | |
| When practical check gate for adequacy of sealing when gate is closed. | | | |
| Note any debris, etc., which may restrict free movement of the gate leaf. | | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|-------------|-------------------------------|----------------|---|
|-------------|-------------------------------|----------------|---|

(2) Hoist

month

Check for proper functioning.

Note need for lubrication cleaning, etc.

Inspect hoist stem guides, connections, etc., and note any need for maintenance.

Note condition of manhole covers and note failure to lock.

Check position of hoist stem to insure that gate is in position desired.

Note condition of all metal work, anchors, etc.

b. Flap Gates

Debris, etc. in or around inlet.

day

Condition of metal work.

6 months

Condition of woodwork

6 months

Functioning of during operation.

day

Condition of equipment provided for opening for irrigation

6 months

Note any indication of leakage when closed.

week

Miscellaneous

| <u>ITEM</u> | <u>PERIOD EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT. & INITIAL</u> |
|---|-------------------------|----------------|---------------------------------------|
| 9. <u>Compressed Air System</u> | 3 months | | |
| a. Compressor performance including operation test. | | | |
| b. Lubrication | | | |
| c. Leakage | | | |
| d. Metal work | | | |
| e. Miscellaneous | | | |
| 10.. <u>Fire Protection Equipment</u> | | | |
| a. Check extenguishers. | month | | |
| b. Note any possible fire hazards in and around the pumping plant and other installations. | day | | |
| c. Inspect storage room. | day | | |
| 11. <u>Staff Gages</u> | month | | |
| a. Condition of woodwork | | | |
| b. Are all in place | | | |
| c. Condition of painted surfaces | | | |
| 12. <u>Pumping Plant Structure</u> | | | |
| a. Windows | month | | |
| b. Doors | month | | |
| c. Roof | year | | |
| d. Floor | year | | |
| e. Foundation | year | | |
| f. Walls | year | | |
| g. Painted surfaces | year | | |
| h. Miscellaneous | year | | |

| <u>ITEM</u> | <u>PERIOD</u> <u>EVERY</u> | <u>REMARKS</u> | <u>DATE, MAINT.</u> <u>& INITIAL</u> |
|--|-------------------------------|----------------|---|
| 13. <u>Miscellaneous</u> | | | |
| a. Note need for policing the area around the pumping plant and other installations. | month | | |
| b. Note whether plant doors are in good condition and lock functions properly. | month | | |
| c. <u>Painting</u> : Check all metal work and note rust spots need for painting or other maintenance. | year | | |
| d. <u>Hazards</u> : Check all manhole covers to insure that they are in place. | month | | |
| Determine adequacy of fencing and gate locks. | | | |
| Note presence of tools, etc., left of floor of operating room. | | | |
| Condition of ladders, etc., used around the plant. | | | |
| Note any fire hazards - paint, oil, rags, paper, etc. | | | |

NOTE:

1. The period indicated is to serve as a general guide. (More frequent inspections shall be made if operating experience and type of service for a particular period justifies.)
2. Under "Remarks" briefly indicate maintenance, adjustment, etc., required.
3. When required maintenance etc., has been completed, indicate date and initial.

EXHIBIT E

Mechanical Electrical Equipment

Lubrication Schedule

Unit No. 159

PROJECT: Sutter Butte Canal Pumping Plants Nos. 1, 2, and 3

| <u>ITEM</u> | <u>LUBRICANT</u> | <u>PERIOD EVERY</u> |
|----------------------------------|--|---|
| 1. <u>Main Pump-Motor Units.</u> | | |
| a. Pumps | | |
| (1) <u>Propeller Pump</u> | | |
| Pump bearings | <u>Oil</u> : Calol Turbine Oil No. 11 | Check daily; add as required. |
| | <u>Grease</u> : Calol WP Grease No. 1 | Check twice daily; add as required. |
| (2) <u>Vertical Volute</u> | | |
| Pump bearings | Grease-water-resistant, non-fibrous and of medium viscosity at the water temperature. LUBRI-PLATE No. 130-AA or Calol WP Grease No. 1 | Check twice daily; and add as required. |
| b. Main Pump Motor | | |
| | <u>Oil</u> : Calol Turbine Oil No. 11 or 15 | Check daily; add as re- quired. |
| | <u>Grease</u> : Calol BRB-340 | Check daily; add as required. |

ITEMLUBRICANTPERIOD EVERY2. Electrical System

a. Transformers

General Electric Co.
Transformer Oil.
Use only that oil
which has been speci-
fically recommended by
the transformer Mfgs.

Check level
every 6 months.
Every 2 years
check oil for
need of filter-
ing.

b. Miscellaneous

(1) Motor bearings:

Check daily.

Ball or roller
Sleeve type

Calol BRB-340
Calol Turbine Oil No. 11

6 months
Check daily.

(2) Switches general Trancil Oil

Monthly

(3) Switch hinge pins Trancil Oil with graphite

Monthly

(4) Relays

General Electric Co.
special relay oil

6 months

(5) Rheostat contacts Light coat of vaseline

After cleaning
and dressing

(6) Instrument, re
orders, etc.

Mfgs. recommendations

Mfgs. recom-
mendations

(7) Push-button
contacts

Petroleum

6 months

(8) Cleaning solvent
Note: When
cleaning any
part of elec-
trical equipment,
use ample pre-
caution to pre-
vent explosions
& fires.

"Stoddard solvent, or a
mixture of carbon
tetrachloride and pe-
troleum."

6 months

c. Motor-Generator Sets. (See 2 b above.)

Check daily
and as required.

| <u>ITEM</u> | <u>LUBRICANT</u> | <u>PERIOD EVERY</u> |
|--|---|---|
| 3. <u>Cranes.</u> | | |
| a. Exposed gears | Calol Pinion Grease 3-X | 6 months. Apply with brush, light application. |
| b. Worm gears | Gear Lubricant RPM No. 90 | |
| c. Ball or Roller bearings | Calol BRB-340 G1 | year |
| d. Miscellaneous bearings (incl cup grease). | <u>Oil:</u> Turbine Oil No. 11 <u>Grease:</u> Calol WP No. 1 or BRB-340 | |
| e. Cable | Light application NO-OX-ID, Type E, rust preventative or Calol WRC Lubricant | yearly |
| f. Rust preventative for machined unpainted surfaces | "Stop-Rust." | |
| g. Sheave block. Application to zerk fittings | Calol WP No. 1 Grease Chassis lubricating grease, "UNO-BA-FI," Chassislube, or Calol WP No. 1 | yearly 3 months |
| h. Exposed metal unpainted surfaces that have a tendency to rust | Apply a light coat of rust preventative "Stop-Rust" - The Delta Mfg. Co. | year |
| 4. <u>Trash Racks.</u> | | |
| 5. <u>Stop Logs.</u> | | |
| 6. <u>Sump Pumps.</u> | | |
| a. Motor bearings | (See 2 b above) | 6 months sparingly |
| b. Pump bearings | <u>Oil:</u> Calol Turbine Oil No. 11 <u>Grease:</u> Calol WP No. 1 | 6 months Check functioning daily during operation. |
| c. Water cooled bearings | Check for proper functioning. | |

| <u>ITEM</u> | <u>LUBRICANT</u> | <u>PERIOD EVERY</u> |
|--|------------------------------------|--|
| 7. <u>Pressure Water System.</u> | | |
| a. Electrical equipment | (See 2 b above) | 6 months |
| b. Pump | Calol WP No. 1 Grease | month |
| c. Water cooled bearings | Check for proper functioning | week |
| 8. <u>Pump Discharge Gates and Hoists.</u> | | |
| Slide Gates | | |
| (1) <u>Gates</u> | | |
| Seal bearing surfaces | Calol WP No. 1 Grease | 6 months |
| Miscellaneous | Rust preventative NO-OX-1D, Type E | 6 months |
| (2) <u>Hoist.</u> | | |
| Screw | Calol WP No. 1 | |
| Stem | " " | |
| Pressure fittings | " " | |
| *Open gears | " " | |
| 9. <u>Pump Discharge Flap Gates.</u> | | |
| Hinge | Calol WP No. 1 | Apply to pin when assembling and coat outside after assembly |

*If grease applied to exposed gears and/or screw is found to be objectionable from the standpoint of accumulation of dirt, lubricate with light oil before operating.

| <u>ITEM</u> | <u>LUBRICANT</u> | <u>PERIOD EVERY</u> |
|-----------------------------------|---|---------------------|
| 10. <u>Air Compressor System.</u> | | |
| a. Compressor | Calol Compressor Oil No. 19 | Maintain level |
| b. Motor | (See 2 b above) | 6 months |
| c. Miscellaneous | Mfgs. recommendations or accepted practice | As requested |

11. General Notes.

a. There are many lubricants suitable for service as pertaining to the above items of equipment. The trade names indicated above are listed as being representative; any equivalent lubricant may be used.

b. Manufacture of lubricants specified above.

- (1) UNO--Union Oil Co.
- (2) NO-OX-ID Dearborn Chemical Co.
- (3) Calol--Standard Oil Co. of Calif.
- (4) Trancil--General Electric Co.
Special Oil for electrical equipment.
- (5) RPM--Standard Oil Co. of Calif.
- (6) "Stop-Rust"--The Delta Mfg. Co., Milwaukee, Wisconsin.
- (7) Stoddard Solvent--Described in U. S. Bureau of Standards
as "Commercial Standard GS-3-28".

c. Electrical equipment shall be lubricated only where recommended by the equipment manufacturers or in accordance with best accepted practice for the service. Where lubrication is required, lubricate adequately but sparingly, wiping off any excess lubricant, as oily surfaces collect dust and may result in an arc between live parts.

d. The above schedule is provided as a general guide in the absence of specific recommendations from the manufacturer of the respective items of equipment. Use only the best grades of lubricants and of the type and in accordance with the manufacturer's recommendation where available. When in doubt consult with one of the manufacturers of lubricants suitable for the service.

EXHIBIT F
LETTER OF ACCEPTANCE
BY STATE RECLAMATION BOARD

EXHIBIT F



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

NOV 29 2016

Ms. Leslie M. Gallagher
Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, CA 95821

Dear Ms. Gallagher:

The purpose of this letter is to notify the Central Valley Flood Protection Board of the completion of an effort to update the Operation and Maintenance Manual Supplements for the Sacramento River Flood Control Project and the Lower San Joaquin River Levees and Lower San Joaquin River and Tributaries Project. These updates are a compilation of revisions made to the project over time and where we had record of a transfer letter to the Board. These updated supplements are the most current version and should be utilized as the baseline version for any future project modifications.

This process and the compiled updates have been coordinated with the Central Valley Flood Protection Board and Department of Water Resources staffs for review and comment. All comments have been addressed or incorporated into the manuals.

The Board staff has been provided a copy of the manuals in electronic format. Future updates will include entire unit supplements so updates can be seen in context with the entire unit supplement. The list of completed supplements, by the unit number and title, are attached. If you have any questions regarding this transmittal, please contact Gary Kamei at 916-557-6845.

Sincerely,

A handwritten signature in black ink, appearing to read "D. G. Ray", is positioned above the typed name and title.

David G. Ray, P.E.
Colonel, U.S. Army
District Commander

Enclosures

| Standard O&M Manual Sacramento River Flood Control Project | |
|---|---|
| Unit No. | Project Name |
| 101 | RD 341 Sherman Island |
| 102 | E. Levee of Sac River, Isleton to Threemile Slough & N. Levee of Threemile Slough from Sac River to SJ River |
| 103 | Both Levees of Georgiana Slough & E. Levee of Sac River from Walnut Grove to Isleton |
| 104 | Levees around Grand Island |
| 105 | Levees Around Reyer Island |
| 106 | S. Levee Lindsey Slough & W. Levee of Yolo BP from Lindsey Slough to Watson Hollow and N. Levee of Watson Hollow Drain |
| 107 | Levees Around Hastings Tract |
| 108 | Levees Around Peters Tract |
| 109 | West Levee of Yolo Bypass & E. Levee of Cache Slough |
| 110 | Levees Around Sutter Island |
| 111 | E. Levee of Sac River from Freeport to Walnut Grove |
| 112 | Levees Around Merritt Island |
| 113 | E. Levee Yolo Bypass, N. Levee Miner Slough, W. Levees Sutter Slough, Elkhorn Slough & Sac River, All Bordering RD 999 |
| 114 | W. Levee of Sac River from Northern Boundary of RD 765 to Southern Boundary of RD 307 |
| 115 | E. Levee of Sac River from Sutterville Rd to Northern Boundary of RD 744 |
| 116 | W. Levee of Sac River from Sac Weir to Mi 51.2 & S. Levee of Sac Bypass & E. Levee of Yolo Bypass from Sac Bypass to Southern Boundary of RD 900 |
| 117 | E. Levee Sac River through City of Sac from Tower Bridge to Sutterville Rd |
| 118.1 | E. Levee of Sac River from American River to Tower Bridge & S. Levee of American River from Mayhews Downstream to Sac River |
| 118.2 | N. Levee American River, E. Levee Natomas Canal, Both Levees Arcade Creek, S. Levee Linda Creek, & Magpie Creek Diversion Channel |
| 118.2 Sup | Vegetation on Mitigation Sites E. Levee of Sac River from American River to Tower Bridge & S. Levee of American River from Mayhews Downstream to Sac River |
| 119 | Putah Creek Channel & Levees & W. Levee of Yolo Bypass from Yolo Causeway Downstream 3 mi. Includes O&M manual for the Yolo Basin wetlands, and South Fork Putah Creek Preserve Restoration Section 1135 Authorization. |
| 120 | Relocated Willow Slough Channel & Levees & W. Levee Yolo Bypass from mouth of Relocated Willow Slough to Yolo Causeway |
| 121 | R. Levee of Yolo Bypass from Willow Slough Bypass to Woodland Rd RD2035 |
| 122.1 | W. Levee of Sac River from Mi 70.8 to Sac Weir & N. Levee of Sac Bypass & E. Levee of Yolo Bypass from Woodland Hwy to Sac Bypass |
| 123 | W. Levee of Sac River from East End of Fremont Weir to Mi 70.8 & E. Levee of Yolo Bypass from East End Fremont Weir to Woodland Hwy RD 1600 |

| | |
|-------|--|
| 124 | N. Levee of American River from Natomas E. Canal to Sac River & E. Levee of Sac River from Natomas Cross Canal to American River. Includes supplement, Vegetation on Mitigation Sites. |
| 125 | Back Levee of RD 1000 |
| 126 | Cache Creek Levees & Settling Basin Yolo Bypass to High Ground |
| 127 | Knights Landing Ridge Cut & Sac River & Yolo BP Levees of RD's 730 and 819 & S. Levee of Sycamore Slough |
| 128 | E. Levee of Sac River from Sutter Bypass to Tisdale Weir all within RD 1500 |
| 129 | S. Levee of Tisdale By-Pass from E. Levee Sac River to W. Levee Sutter BP & W. Levee of Sutter BP Downstream to E. Levee of Sac River |
| 130 | W. Levee Sac River from Sycamore Slough to Wilkins Slough (Mi. 89.9 to Mi. 117.8) |
| 131 | W. Levee Sac River from Wilkins Slough to Colusa (Mi. 117.8 to Mi. 143.5) |
| 132 | Back Levees of RD 108 |
| 133 | E. Levee of Sac River from Winship School to Tisdale BP & N. Levee of Tisdale BP & W. Levee of Sutter BP from Long Bridge to Tisdale BP |
| 134 | Levees of RD 70, E. Levee of Sac River from Butte Slough Outfall Gates to Winship School & W. Levee of Sutter BP from Butte Slough Outfall Gates to Long Bridge |
| 135 | E. Levee of Sutter BP from Sutter Buttes Southerly to Junction with Feather River & E. & W. Levees of Wadsworth Canal & Levee of Intercepting Canals |
| 136 | E. Levee of Sac River from Butte Slough Outfall Gates to the Princeton-Afton Rd (Mi. 138.3 to Mi. 164.4) |
| 137 | W. Levee of Sac River from North End of Princeton Warehouse to Colusa Bridge |
| 138 | E. Levee of Sac River from Parrott-Grant Line to Princeton-Afton Rd |
| 139 | W. Levee of Sac River from N. Boundary of LD 2 to North End of Princeton Warehouse |
| 140 | W. Levee of Sac River in LD 1 (Mi. 170.5 to Mi. 184.7). Includes mitigation site O&M manual, Yuba County |
| 141.1 | E. Levee of Feather River from Bear River to Natomas CC & S. Levee of Bear River & Both Levees of Yankee Slough. Parts 1 and 2 |
| 141.2 | E. Levee of Feather River from Bear River to Natomas CC & S. Levee of Bear River & Both Levees of Yankee Slough. Parts 1 and 2 |
| 142 | Back Levee of RD 1001 |
| 143 | W. Levee of Feather River from North Boundary of RD 823 to E. Levee of Sutter Bypass |
| 144 | W. Levee of Feather River from North Boundary of LD 1 to North Boundary of RD 823 |
| 145 | E. Levee of Feather River, S. Levee of Yuba River, Both Levees of WPRR Intercepting Channel, W. Levee of South Dry Creek & N. Levee of Bear River |
| 146 | N. Levee of Bear River & S. Levee of South Dry Creek RD 817 & Vicinity of Wheatland |
| 147 | Levee Around the City of Marysville & N. Levee of Yuba River to a Point 1.8 Mi. Upstream from Marysville |

| | |
|-----|---|
| 148 | W. Levee of Feather River from North Boundary of RD 777 to North Boundary of LD 1 |
| 149 | S. Levee of Yuba River Maintenance Area No. 8 |
| 151 | E. Levee Feather River from Honcut Creek to Marysville & S. Levee of Honcut Creek & E. Levee of RD 10 |
| 152 | W. Levee of Feather River from N. Boundary of RD 777 to Western Canal Intake (Levee of Drainage District No. 1) |
| 153 | Lower Butte Creek Channel Improvement, Colusa, Glenn & Butte Counties |
| 154 | Moulton Weir & Training Levee Sacramento River |
| 155 | Colusa Weir & Training Levee Sacramento River |
| 156 | Tisdale Weir & Bypass |
| 157 | Fremont Weir, Sacramento River |
| 158 | Sacramento Weir, Sacramento River |
| 159 | Pumping Plants No. 1, 2 & 3, Sutter Bypass |
| 160 | Sutter Butte Canal Headgate |
| 161 | Butte Slough Outfall Gates |
| 162 | Knights Landing Outfall Gates, Sacramento River |

| Standard O&M Manual San Joaquin River | |
|--|--|
| Unit No. | Project Name |
| 1 | Right Bank Levee of the San Joaquin River & French Camp Slough within RD 404 |
| 2 | Right Bank Levee of the San Joaquin River & French Camp Slough within RD 17 |
| 3 | North Levee of Stanislaus River & East Levee of the San Joaquin River within RD 2064, 2075, 2094 and 2096 |
| 4 | East Levee of San Joaquin River within RD 2031 |
| 5 | East Levee of the San Joaquin River Within RD No. 2092 |
| 6 | East Levee of the San Joaquin River in RD Nos. 2063 & 2091 |
| 7 | West Levee of San Joaquin River & North Levee of Old River RD Nos. 524 & 544 |
| 8 | Right Banks of Old River & Salmon Slough Within RD No. 1 & RD No. 2089 |
| 9 | Levees Around RD No. 2062 & San Joaquin County Flood Control District Area No.2 |
| 10 | West Levee of Paradise Cut RD No. 2058 & SJ County Flood Control District, Area No.2 |
| 11 | West Levee of San Joaquin River from Durham Bridge to Paradise Dam Within RD No. 2085 & 2095 |
| 12 | West Levee of San Joaquin River From Opposite Mouth of Tuolumne River Downstream to Stanislaus County Line Within RD Nos. 2099, 2100, 2101, & 2102 |
| 13 | West Levee of the San Joaquin River in RD No. 1602 |

WAR DEPARTMENT
U. S. ENGINEER OFFICE
P. O. Box 1739 WRIGHT BLDG. 1209 8TH ST.
SACRAMENTO, CALIFORNIA

9 September 1944

REFER 024.5 (Sacramento River) PAIRG-D
NO.

SUBJECT:

TO: The Reclamation Board
11th and O Streets
Sacramento, California

Gentlemen:

All construction on Sutter By-Pass Pumping Plant No. 2, prosecuted under Contract No. W-1105-eng-1634, and additional work done under subsequent Job Orders Nos. 760, 761 and 970 has been completed. It is desired to turn over to the Reclamation Board for maintenance by the State of California this completed pumping plant.

This facility, which forms an integral part of the Sacramento River Flood Control Project, is located along the easterly levee of Sutter By-Pass, about 1.5 miles north and 5.5 miles west of Tudor Station on the Southern Pacific Railway, or about 3 miles south and 3 miles west of Yuba City, and 6 miles west of the Garden Highway. Its function is to dispose of intercepted drainage originating east of the Sutter By-Pass and it affords protection against floods to the entire area in this vicinity. The detail and extent of the work are shown by the following specifications and drawings, copies of which are forwarded herewith, under separate cover.

Specifications (No. 6737) issued under Contract No. W-1105-eng-1634 and Addenda Nos. 1 to 3 thereto, Drawing No. 50-25-1446 in seven sheets, Drawing No. 50-25-1444 in one sheet, Drawing No. 50-25-1513 in one sheet, and Drawing No. 50-25-1533 in one sheet, for Construction of Sutter By-Pass Pumping Plant No. 2.

It is requested that receipt of this letter be acknowledged, together with the acceptance by the State of California of the construction, and it will be assumed by this office that the construction referred to above has been accepted by the State of California unless this office is advised to the contrary on or before 1 October 1944.

Incls. (under a/c)

As stated

cc w/cy incls.:
Mr. Richard Hyatt, State Engr.
Div. of Water Resources
401 Public Works Bldg.
Sacramento, California

c.c. Field Section Engineer
Sacramento Field Section

159

December 29, 1941

The Reclamation Board
State Office Building
Sacramento, Calif.

Gentlemen:

All construction on Sutter Bypass Pumping Plant No. 3, prosecuted under Contract No. W-1105-eng-1634, and additional work done under Job Order No. 732, providing for the construction of timber check gates, grouted cobble ditch paving at mouth of inlet ditches and reinforced concrete wing walls at discharge conduit, has been completed. It is desired to turn over to the Reclamation Board for maintenance by the State of California this completed pumping plant. This facility, which is required by the Sacramento Flood Control Project, is located along the easterly levee of Sutter Bypass, about 1.5 miles west of Sutter City Station, California. Its function is to dispose of intercepted drainage originating east of the Sutter Bypass, and it thus affords protection against floods to the area between the easterly levee of Sutter Bypass and the westerly levee of Wadsworth Canal.

For the records of this office, your acceptance of the above completed work, by letter, is requested. Conforming to the provisions of Section 2 (4) of Chapter 656, Statutes of California, 53rd Session, 1939, (Act 8831, 1939 Supplement, California Codes), a copy of this letter, with inclosures, is being transmitted to the State Engineer.

FOR THE DISTRICT ENGINEER:

CC - Mr. Edward Hyatt,
State Engineer,
Sacramento, Calif.

Area Engineer, Upper Sacramento Area.

Clay Anderson
Lieut.-Col., Corps of Engineers
Executive Assistant.

U. S. ENGR. OFFICE
& CALIF. DEPT. OF CON.

DEC 29 1941

DISPATCHED BY

662.8(PC)5-257;2

159

Encl #3

September 23, 1940

The Reclamation Board
State Office Building
Sacramento, California

Gentlemen:

It is desired to turn over to the Reclamation Board, for maintenance by the State of California and other local interests concerned, the completed Sutter By-Pass Pumping Plant No. 1. This facility, which is required by the Sacramento Flood Control Project, is located on the easterly side of the Sutter By-Pass about 1.5 miles south and 0.5 miles west of Marcuse Station on the Southern Pacific Railroad, or about 14 miles south of Yuba City and 1.5 miles west of the Garden Highway. Its function is to dispose of intercepted drainage originating east of the Sutter By-Pass, and it thus affords protection against floods to Levee District No. 1, Reclamation District No. 803, and Reclamation District No. 823.

The construction work involved in completing this structure consisted of enlarging and modifying the plant which existed at the site at the time this office began participation in the Sacramento Flood Control Project. The work, done by the Frederick W. Snook Co. under contract with this office, was completed on April 23, 1936, and accepted on October 5, 1936. Details and extent of the work are shown by the following specification and drawings, duplicate copies of which are transmitted under separate cover:

a. Specification No. 6757 (Circular Proposal H.1105-35-237), dated May 25, 1935, with five (5) addenda thereto dated as follows: June 11, 1935, June 13, 1935, June 18, 1935, June 21, 1935, and June 29, 1935.

b. Drawings:

| File No. | Title |
|------------------------|---|
| 60-25-1445-1 (7 dwgs.) | Proposed Sutter By-Pass Pumping Plant No. 1 (Details of Construction) |
| 60-25-1496 (1 dwg.) | Details of Septic Tank |
| 60-25-228 (1 dwg.) | Pump House for Domestic Plant. |

Accepted
10/25/40

Incl #1

Contractor's construction drawings, motor and pump manufacturer's drawings and descriptive literature, and results of tests on equipment, all of which pertain to the structural and mechanical details of the plant as constructed, are on file in this office and are available for your inspection and use as required.

For your information, the two remaining Sutter By-Pass Pumping Plants; viz., Plant No. 2 about 6 miles northwest of Tudor, and Plant No. 3 about 3 miles southwest of Sutter City, which were constructed concurrently and under the same contract as for Pumping Plant No. 1, are not being turned over at this time. Both of these facilities will be transferred at a later date, but in the meantime, however, the maintenance and operation of the plants should be carried on in the same manner as now obtains.

For the records of this office, your acceptance of the above-mentioned completed flood control works by letter is requested.

Very truly yours,

E. E. Haring
Major, Corps of Engineers
Acting District Engineer. *486*

✓
10 Incl. (each in dupl.)
Spec. No. 6757 (C.P. No. 1105-35-237 w/5 addenda)
Dwg. File No. 50-25-1445-1 (7 dwgs.)
Dwg. File No. 50-25-1496 (1 dwg.)
Dwg. File No. 50-25-228 (1 dwg.)
all under separate cover.

U. S. ENGR. OFFICE
& CALIF. DEBRIS COM.

SEP 23 1940

DISPATCHED BY *av*

Reply line 257.1

159

LETTERHEAD

October 25, 1940

Subject: Sutter By-pass Pumping Plant No. 1--Acceptance of

California Debris Commission
Post Office Building
Sacramento, California

Gentlemen:

Reference your letter of September 23, 1940, turn-over to The Reclamation Board, for maintenance by the State of California and other local interests concerned, of the completed Sutter By-pass Pumping Plant No. 1 (Specification No. 6757, with addenda, and Drawings Nos. 50-25-14-45-1(7) and 50-25-1496 and 80-25-228).

Enclosed herewith is a resolution of The Reclamation Board dated October 16, 1940, in which The Reclamation Board does accept for maintenance and operation by the State of California and other local interests concerned, the said items of work as completed.

For your information, the said work has, on the same date, been turned over for maintenance and operation to the Department of Public Works of the State of California.

Very truly yours,

THE RECLAMATION BOARD
A. M. BARTON
Chief Engineer and General Manager

BY

S. A. HonakerSAH:AP
Encl.

RESOLUTION

ACCEPTING FOR MAINTENANCE CERTAIN WORK OF
"NEW CONSTRUCTION" AS COMPLETED BY THE WAR
DEPARTMENT, U. S. ARMY, CORPS OF ENGINEERS
(CALIFORNIA DEBRIS COMMISSION).

- - - -

WHEREAS, The Reclamation Board did heretofore approve of certain items of work of "new construction", to-wit, Sutter By-pass Pumping Plant No. 1, to be located on the easterly side of the Sutter By-pass, approximately 1.5 miles south and 0.5 mile west of Marouse Station on the Southern Pacific Railroad, or approximately 14 miles south of Yuba City and 1.5 miles west of the Garden Highway, in Sutter County, California, the function of which said Pumping Plant is to dispose of intercepted drainage originating east of the Sutter By-pass, and thus afford protection against floods to Levee District No. 1 of Sutter County, Reclamation District No. 903, and Reclamation District No. 823; and, whereas, said Board did heretofore request the California Debris Commission to proceed with said work, as contemplated in the Report of that Commission dated January 5, 1928, and in Section 37a of The Reclamation Board Act as amended, and did heretofore cause to be made available, and allot from the "Joint Navigation and Flood Control Project Fund", construction budget, moneys in an amount sufficient to cover the State of California's one-half portion of the total cost of said work; and,

WHEREAS, the WAR DEPARTMENT, U. S. Army, Corps of Engineers, (California Debris Commission) under communication dated September 25, 1940, has notified The Reclamation Board of the completion of such work of "new construction" and of its desire to turn over to The Reclamation Board such work as completed for maintenance by the State of California and other local interests concerned, and has requested that such work be accepted by said Board; and,

WHEREAS, the Chief Engineer of The Reclamation Board has requested, the State Department of Public Works to make an inspection on the ground of such work of "new construction", and said Department and said Chief Engineer of The Reclamation Board have found and determined that such work, as completed, has been prosecuted and carried out in conformance with the plans and specifications therefor as heretofore approved by said Board;

NOW, THEREFORE, BE IT RESOLVED AND ORDERED that The Reclamation Board does hereby accept for maintenance and operation by the State of California and other local interests concerned, the said item of work of "new construction" aforesaid as completed, and as turned over to said Board by the WAR DEPARTMENT, U. S. Army,

Corps of Engineers (California Debris Commission).

Dated, October 16, 1940

- - - -

STATE OF CALIFORNIA)
COUNTY OF SACRAMENTO)
Office of The Reclamation Board) SS.

I, S. A. HONAKER, Assistant Secretary of The Reclamation Board, do hereby certify that the above and foregoing is a full, true and exact copy of a Resolution duly passed and adopted by said Board at its regular monthly meeting held October 16, 1940.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of The Reclamation Board this 25th day of October, 1940.

(SEAL)

S. A. HONAKER
Assistant Secretary
The Reclamation Board

C
O
P
Y

LETTERHEAD

October 11, 1944

Secretary
California Debris Commission
Wright Building
1209 - 8th Street
Sacramento, California (8)

Dear Sir:

Reference is made to your letter of September 9, 1944, transmitting plans and specifications for and notifying the Board of completion of Sutter By-pass Pumping Plant No. 2.

In accordance with said letter, there is enclosed copy of a resolution adopted by The Reclamation Board at its October 4, 1944 meeting, accepting said work as completed and authorizing the turn-over of same to the Department of Public Works for maintenance.

Very truly yours,
THE RECLAMATION BOARD
A. M. BARTON
Chief Engineer and General Manager
By /s/G. F. Mellin
G. F. MELLIN

C
O
P
Y

R E S O L U T I O N

PASSED AND ADOPTED BY THE RECLAMATION BOARD OCTOBER 4, 1944

WHEREAS The Reclamation Board did heretofore approve of a certain item of work of "new construction", said work consisting of the construction of Sutter By-pass Pumping Plant No. 2, for the purpose of disposing of intercepted drainage collected behind the Sutter By-pass Pumping Plant No. 2, for the purpose of disposing of intercepted drainage collected behind the Sutter By-pass East levee near Gilsizer Slough; and

WHEREAS The War Department, U. S. Engineer Office, District Engineer, under date of September 9, 1944, has notified The Reclamation Board of the completion of such work of "new construction" and its desire to turn over to The Reclamation Board such work, as completed, for maintenance by the State Engineer; and

WHEREAS Paragraph (C) of Section 8361 of the Water Code, being Chapter 369 of the Statutes of 1943, directs that said work shall be operated and maintained by the State Engineer; and

WHEREAS the Chief Engineer of The Reclamation Board has caused to be made inspection on the ground of such work of "new construction", and has found and determined that such work, as completed, has been prosecuted and carried out in conformance with the plans and specifications therefore; now therefore be it

RESOLVED AND ORDERED, That The Reclamation Board does hereby accept, for the State of California, the said item of "new construction" as aforesaid which has, on the date hereinabove set forth, been turned over to said Board by The War Department, U. S. Engineer Office; and be it further

RESOLVED AND ORDERED, That said work be turned over to the Department of Public Works, acting by and through the State Engineer, for maintenance and operation, as authorized in Section 8361 of the Water Code of the State of California.

| | | |
|---------------------------------|---|-----|
| STATE OF CALIFORNIA |) | |
| COUNTY OF SACRAMENTO |) | |
| Office of The Reclamation Board |) | SS. |

I, G. F. MELLIN, Assistant Engineer of The Reclamation Board do hereby certify that the attached and foregoing is a true and correct copy of a resolution duly passed and adopted by said Board at its meeting held October 4, 1944.

IN WITNESS WHEREOF, I have set my hand and affixed the official seal of The Reclamation Board this 10th day of October 1944.

/s/ G. F. Mellin
G. F. MELLIN
Assistant Engineer & Appraiser
The Reclamation Board

LETTERHEAD

January 12, 1943

Subject: Levee construction completed - Acceptance and
Maintenance of East Sutter By-pass Pumping Plant
No. 3 - Contract No. W-1105-eng-1634 - Additional
work under Job Order No. 732.

Secretary, California Debris Commission
Wright Building
Sacramento, California

Dear Sir:

Reference is made to your letter of December 29, 1941, requesting acceptance by The Reclamation Board of the above project works, and to your letter of October 26, 1942, advising that your office does not recognize further responsibility with respect to construction of Pumping Plant No. 3.

Enclosed herewith, are copies of certified resolutions adopted by The Reclamation Board at its January 6, 1943, meeting, accepting said works for maintenance and operation, and turning over same to the Division of Water Resources of the Department of Public Works, State of California, for maintenance, operation and control, in accordance with the provisions of Section 2, Chapter 597, Statutes of 1935.

Very truly yours,

THE RECLAMATION BOARD
A. M. BARTON
Chief Engineer and General Manager

By _____
MAURICE E. ATKINSON

MEA/ml

Encl

R E S O L U T I O NACCEPTING FOR MAINTENANCE AND OPERATION
OF WORK OF "NEW CONSTRUCTION" UNDER THE SACRAMENTO
RIVER FLOOD CONTROL

- - - -

WHEREAS The Reclamation Board did heretofore approve of certain items of work of new construction (said work consisting of the construction of three drainage pumping plants along the easterly levee of the Sutter By-pass, for the purpose of pumping intercepted drainage into the By-pass) to be performed at various locations along the easterly levee of the Sutter By-pass in Sutter County, California; and

WHEREAS the War Department, U. S. Army, Corps of Engineers, and the California Debris Commission, under date of December 29, 1941, and October 10 and October 26, 1942, by separate communications covering the specific item of work as listed in Exhibit "A" attached hereto, has notified The Reclamation Board of the completion of such work of new construction and of its desire to turn over to The Reclamation Board such work as completed for maintenance by the State of California, Department of Public Works, Division of Water Resources, in accordance with the provisions of Section 2, Chapter 597, Statutes of 1935; and has requested that such work be accepted by said Board; and

WHEREAS the Chief Engineer and General Manager of The Reclamation Board and the State Engineer have caused to be made inspections on the ground of such work of new construction as listed in Exhibit "A" attached hereto, and has found and determined that such work as completed has been prosecuted and carried out in conformance with the plans and specifications therefore as heretofore approved by said Board; Now, therefore, be it

RESOLVED AND ORDERED, That The Reclamation Board hereby accepts for maintenance and operation said item of work of new construction as listed in Exhibit "A" attached hereto, which has, on the dates hereinabove set forth, been turned over to said Board by the War Department, U. S. Army, Corps of Engineers, and the California Debris Commission.

EXHIBIT "A"

(Adopted by The Reclamation Board at meeting held January 6, 1943)

LISTING OF COMPLETED ITEM OF WORK OF NEW CONSTRUCTION
TURNED OVER TO THE RECLAMATION BOARD BY THE WAR DEPART-
MENT, CORPS OF ENGINEERS, U. S. ARMY, AND CALIFORNIA
DEBRIS COMMISSION, FOR MAINTENANCE AND OPERATION IN
ACCORDANCE WITH THE TERMS OF THE SACRAMENTO RIVER FLOOD
CONTROL PROJECT

(By letter dated December 29, 1941) All construction on Sutter By-pass Pumping Plant No. 3, located at a point along the easterly levee of the Sutter By-pass about 2.0 miles south and 1.5 miles west of Sutter City Station on the Sacramento Northern Railway, and about 0.5 miles south of Franklin Road in Sutter County, California, as prosecuted by War Department, U. S. Engineer Office, Contract No. W-1105-eng-1634, and additional work done under Job Order No. 732, providing for the construction of timber check gates, grouted cobble ditch paving in mouth of inlet ditches, and reinforced concrete wing walls at discharge conduit.

Said works are within the jurisdiction of the State of California, Department of Public Works, Division of Water Resources, in accordance with the provisions of Section 2, Chapter 597, Statutes of 1935.

STATE OF CALIFORNIA)
COUNTY OF SACRAMENTO) SS
Office of The Reclamation Board)

I, JESSE H. CAVE, Secretary of The Reclamation Board, do hereby certify that the attached is a true and correct copy of a Resolution passed and adopted by said Board at its meeting held January 6, 1943.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of The Reclamtion Board, this 6th day of January, 1943.

JESSE H. CAVE
Secretary
The Reclamation Board

EXHIBIT G

SUGGESTED SEMI-ANNUAL REPORT FORM

EXHIBIT G

✓

CORPS OF ENGINEERS, U. S. ARMY
Office of the District Engineer
SACRAMENTO DISTRICT
Wright Bldg., 1209-8th St.
Sacramento, California

TO: The District Engineer
Sacramento District
Corps of Engineers
1209-8th Street
Sacramento, California

(1 May 19__)
(1 Nov 19__)

Dear Sir:

The semi-annual report for the period (1 May 19__ to 31 October 19__)
(1 November 19__ to 30 April 19__) Pumping Plants Nos. 1, 2, and 3, Sutter
Bypass.

a. The physical condition of the protective works is indicated by the
inspector's report, copies of which are inclosed, and may be summarized as
follows:

(Superintendent's summary of conditions)

It is our intention to perform the following maintenance work in
order to repair or correct the conditions indicated:

(Outline the anticipated maintenance operations for the following
6 months.)

b. During this report period, major high water periods (water level
at 29.0 to 26.5 at Plant No. 1; 30.0 to 27.8 at Plant No. 2; and 38.5 to
36.0 at Plant No. 3) occurred on the following dates:

| <u>Dates and Plant No.</u> | <u>Maximum Elevation</u> |
|----------------------------|--------------------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Comments on the behavior of the protective works during such high water periods are as follows:

(Superintendent's log of flood observations)

During the high water stages when the water level reached a height of _____, on the gage or excess thereof (dates) _____, it was necessary to organize and carry out flood operations as follows:

(See Maintenance Manual _____.)

c. The inspections have indicated (no) or (the following) encroachments or trespasses upon the project right-of-way.

d. (No) (_____) permits have been issued for (the following) improvements or construction within the project right-of-way.

Executed copies of the permit documents issued are transmitted for your files.

e. The status of maintenance measures, indicated in the previous semi-annual report as being required or as suggested by the representatives of the District Engineer, is as follows:

(Statement of maintenance operations, item by item with percent completion.)

f. The fiscal statement of the Superintendent's operations for the current report period is as follows:

| | <u>Labor</u> | <u>Material</u> | <u>Equipment</u> | <u>Overhead</u> | <u>Total</u> |
|---------------------------------|--------------|-----------------|------------------|-----------------|--------------|
| 1. Inspection | | | | | |
| 2. Maintenance | | | | | |
| 3. Flood fighting operations | | | | | |
| TOTAL | | | | | |

Respectfully submitted,

Superintendent of Works